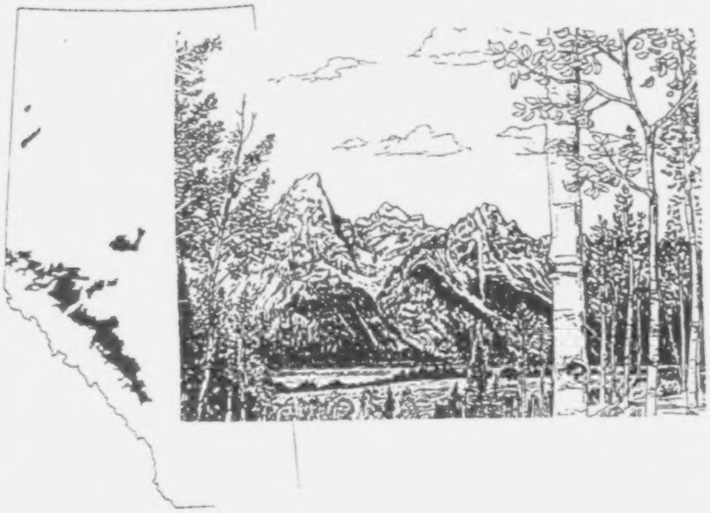
GUIDE TO RANGE PLANT COMMUNITY TYPES AND CARRYING CAPACITY FOR THE UPPER FOOTHILLS SUBREGION OF ALBERTA



Alberta
SUSTAINABLE RESOURCE
DEVELOPMENT
Public Lands
& Forests

RANGE PLANT COMMUNITY TYPES AND CARRYING CAPACITY FOR THE UPPER FOOTHILLS SUBREGION OF ALBERTA

Fifth approximation

(This publication is a revision of the fourth approximation of the Range Plant Communities and Carrying Capacity for the Upper Foothills Publication No. T/003)

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Table of contents

Page

Introduction 1

Climate of the Upper Foothills subregion 1

Approach and Methods of Classification 3

  Approach: Ecological classification hierarchy and terminology 3

  Methods: Plant community classification 3

Range Management Concepts and Methods 5

  Ecologically sustainable stocking rates 5

  Rangeland Health 6

How to use this guide 6

Results 7

Native grass and shrublands 34

  Key to grasslands 39

  Key to modified grass and shrublands 40

  Key to native shrublands 41

A. Grasslands

UFA1. Water sedge meadows 42
UFA2. Sedge-Slender wheatgrass/Meadow rue 43
UFA3. Tufted hairgrass-Sedge 44
UFA4. Tufted hairgrass-Sedge-Slender wheatgrass 45
UFA5. Rough fescue-Tufted hairgrass 46
UFA6. Rough fescue-Hairy wildrye 47
UFA7. Rough fescue/Bearberry 48
UFA7a.California oatgrass-Rough fescue/Bearberry 49
UFA8. California oatgrass-Sedge 50
UFA9. Junegrass/Sedge 51

UFA10. Bearberry/Slender wheatgrass 52
UFA11. Fireweed/Hairy wildrye(Forb meadow) 53
UFA12. Rough fescue-Bog sedge 54
UFA13. Alpine rough fescue 55
UFA14. Cow parsnip-Meadow rue/Fringed brome 56
UFA15. Hairy wildrye-Sedge 57
UFA16. Hairy wildrye-Rough fescue/Bearberry 58
UFA17. Idaho fescue-Parry oatgrass-Sedge 59

B. Shrublands

UFB1. Willow-Bog birch/Water sedge 60
UFB2. Willow/Slender wheatgrass-Sedge 61
UFB3. Willow-Bog birch/Tufted hairgrass 62
UFB4. Willow-Bog birch/Rough fescue 63
UFB5. Bog birch/Rough fescue/Bearberry 64
UFB6. Willow-Bog birch/California oatgrass-Sedge 65
UFB7. Pussy willow shrubland 66
UFB8. Willow-Bog birch/Hairy wildrye-Sedge 67
UFB9. Bog birch/Sedge-Marsh reedgrass 68
UFB10. Willow-Bog birch/Sedge 69
UFB11. Willow-Bog birch 70
UFB12. Alder-Willow/Horsetail 71
UFB13. Willow/Sedge-Cottongrass 72

C. Shrublands and Grasslands modified by grazing 73

UFC1. Slender wheatgrass-Sedge/Low forbs 76
UFC2. Rocky Mtn. fescue/Graceful cinquefoil 77
UFC3. Kentucky bluegrass/Dandelion-Clover 78
UFC4. Kentucky bluegrass-Sedge/Dandelion 79
UFC5. Tufted hairgrass-Kentucky bluegrass 80
UFC6. Sedge-Tufted hairgrass 81
UFC7. Creeping red fescue/Clover 82
UFC8. Kentucky bluegrass-Timothy/Meadow rue 83
UFC9. Purple oatgrass-Rough fescue 84
UFC10. Willow/Kentucky bluegrass 85
UFC11. Sedge-Slender wheatgrass-Rough fescue 86

D. Deciduous community types 87

Key to deciduous community types 89

UFD1. Aspen/Rose/Bearberry 91
UFD2. Balsam poplar-White spruce/Willow/Yellow Mtn. avens 92
UFD3. Aspen-Balsam poplar/Rose/Hairy wildrye 93
UFD4. Aspen/Buffaloberry/Hairy wildrye 94
UFD5. Aspen/Marsh reedgrass 95
UFD6. Balsam poplar/Willow/Horsetail 96
UFD7. Aw-Pl/Bunchberry 97

E. Conifer community types 98

Key to conifer community types 100

UFE1. Lodgepole pine/Bog cranberry 102
UFE2. Lodgepole pine-White spruce/Bunchberry 103
UFE3. Lodgepole pine/Willow/Moss 104
UFE4. Lodgepole pine/Marsh reedgrass 105
UFE5. Black spruce/Willow 106
UFE6. White spruce/Horsetail/Moss 107
UFE7. White spruce/Willow 108
UFE8. White spruce/Bearberry 109
UFE9. White spruce/Juniper-Buffaloberry 110
UFE10. White spruce/Moss 111
UFE11. Pl/Bearberry/Hairy wildrye 112
UFE12. Sw/Alder 113

F. Cutblock and burn community types 114

UFF1. Juniper/Hairy wildrye 115
UFF2. Rose/Hairy wildrye 116
UFF2a. Fireweed/Hairy wildrye 117
UFF3. White spruce/Horsetail/Kentucky bluegrass 118
UFF4. White spruce/Moss (Cutblock) 119
UFF4a. Lodgepole pine-White spruce/Moss 120
UFF5. River alder-Willow/Fireweed-Cow parsnip 121
UFF6. Aspen/Fireweed 122
UFF7. Aspen/Blueberry-Bearberry/Hairy wildrye 123
UFF8. Kentucky bluegrass-Creeping red fescue/Clover 124
UFF9. Lodgepole pine/Hairy wildrye 125
UFF10. Fireweed/Pinegrass 126

Literature cited 127

List of Figures

Figure 1. Layout of the Ecological Classification System for Alberta 4
Figure 2. Edatopic grid for the Upper Foothills subregion 16
Figure 3. Overview of native shrub and grassland complex in the Upper Foothills subregion 34
Figure 4. Typical native shrub and grassland transition zone in the Upper Foothills subregion 35
Figure 5. Layout of plant community types for native grass and shrublands in the landscape of the Upper Foothills subregion 38
Figure 6. Heavily grazed Kentucky bluegrass/Dandelion community type 73
Figure 7. Aspen/Marsh reedgrass community type on south facing slopes in the Upper Foothills subregion 87
Figure 8. The Lodgepole pine-White spruce/Bunchberry community is the dominant conifer community type in the Upper Foothills subregion 98
Figure 9. The Juniper/Hairy wildrye community type results from the harvesting of a White spruce/Juniper community 114

List of Tables

Table 1. Ecological sites and ecological site phases of the Upper Foothills subregion 8
- c5 yellow mountain avens 17
- c6 hairy wildrye sedge 18
- c2 hairy wildrye Aw harvested 19
- c4 hairy wildrye Sw harvested 20
- e1b tall bilberry/arnica Pl harvested 21
- e1b tall bilberry/arnica Sw harvested 22
- ff fescue-california oatgrass ecosite 23
- ff1 grassland 24
- ff2 shrubland 25
- ff1a grazed grassland 26
- ff2a grazed shrubland 27
- f4 bracted honeysuckle harvested 28
- g2 forb meadow grazed 29
- g3 grass meadow 30
- g3a grass meadow grazed 31
- j2 horsetail Pb 32
- j1 horsetail Sw harvested 33

Table 2. Native grass and shrublands of the Upper Foothills subregion 36
Table 3. Shrublands and grasslands modified by heavy grazing in the Upper Foothills subregion 75
Table 4. Deciduous community types within the Upper Foothills subregion 90

Table 5. Conifer community types of the Upper Foothills subregion 101

List of Maps

Map 1. Location of the Upper Foothills subregion in Alberta 2

Abstract

The Upper Foothills subregion is found elevationally below the Subalpine and above the Lower Foothills subregions. It is dominated by closed canopied lodgepole pine forests. In the valley bottoms the shrub and grassland community types are a classic example of multiple use land, providing summer range for livestock, prime habitat for many species of wildlife, productive watersheds, and recreational areas. Despite the importance of these vegetation types for livestock grazing, there is little information available on how grazing affects their production. There is little information on forage productivity, carrying capacity and the associated community types with grazing. The lack of information makes it very difficult to development management prescriptions for multiple use. As a result a "Carrying capacity guide" was developed for the Upper Foothills subregion to provide a framework that would easily group the vegetative community types. It is hoped this classification system can be used by field staff to assess carrying capacity and evaluate range condition on lands within the region.

This guide represents the analysis of 572 plots described in the Upper Foothills subregion, near Grande Cache (Willmore Wilderness Park) and west of Rocky Mtn. House during the summers of 1990-2003. The 572 plots represent 73 community types. These types are split into:

A. Native grasslands	18 community types
B. Native shrublands	13 community types
C. Grazing modified types	11 community types
D. Deciduous types	7 community types
E. Conifer types	12 community types
F. Cutblocks and burns	12 community types

The dominant plant species, canopy cover, environmental conditions, response to grazing, forage production and carrying capacity are outlined for each type.

Introduction

The province of Alberta is covered by a broad spectrum of vegetation regions from prairie in the South, to alpine vegetation in the mountains and dense forests in the Central and Northern parts of the province. These broad vegetation regions have been classified into 6 natural regions and 20 subregions for the province (Dept. of Environmental Protection, 1994). Each of the regions consists of groups of plant communities which are influenced by environmental conditions and human impacts. Intensive management of these regions requires the ability to recoqnize the vegetative communities that have similar productivities and respond to disturbance in the same way. The increase in use of Alberta's northern forests has recently stimulated efforts to develop detailed classification systems. Some of these classification systems include Field guide to Forest ecosystems of West Central Alberta (Corns and Annas, 1986) and Field Guide to Ecosites of West-Central Alberta (Beckingham et al., 1996).

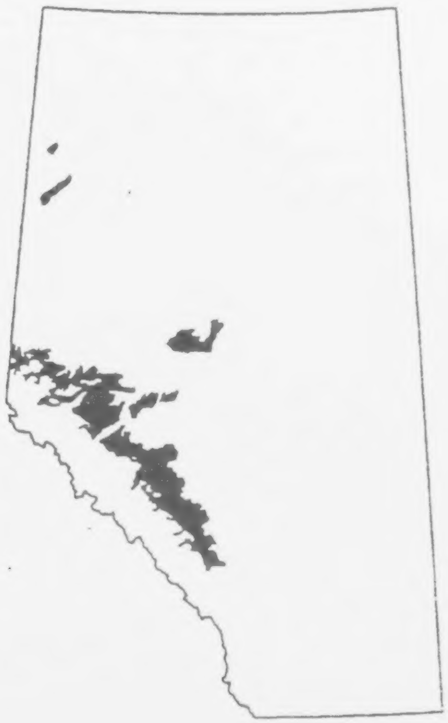
The vegetative communities in the province of Alberta are highly regarded by most resource managers for their ability to provide a wide variety of benefits. They are a classic example of multiple use land, providing summer range for livestock, prime habitat for many species of wildlife, productive watersheds and recreational areas. Despite the importance of these vegetation types for livestock grazing, there is little information available on how grazing affects their production. Specifically, there is little data on the levels of utilization which are detrimental to communities growth. There is also no data on forage productivity, carrying capacity and associated community types with grazing. Traditionally, these community types have been rated at 5 ac/AUM or 60 ac/head/year, but recent work has shown that productivity can vary significantly depending upon the ecological conditions of the site.

The purpose of this guide was to develop a framework that would easily group the vegetative community types in the Upper Foothills subregion of the province. The ultimate goal is a classification system that can be used by the field staff to assess carrying capacity and evaluate range condition on lands within the region. This guide supplements the work done by Beckingham et al. (1996) on the forested community types in the Upper foothills subregion. Their guide describes 73 community types on 14 ecological sites. Beckingham's guide is a good description of the forested community types found within the subregion, but it does not include forage production values and carrying capacities. It also only provides a brief description of the native shrubland and grassland communities which are extensively utilized by livestock and wildlife in this subregion.

Climate of the Upper Foothills subregion

This subregion is found elevationally below the subalpine and above the Lower Foothills subregions. It ranges in elevation from 1200-1500m at lower latitudes and from 1000-1250 m at higher latitudes. It is dominated by closed canopy lodgepole pine forests with the potential climax species on reference sites being white spruce and black spruce. This subregion can be distinguished from the Subalpine subregion by the lack of engelmann spruce and from the Lower Foothills by the lack of aspen.

This subregion has a boreal climate which is modified by the Rocky Mountains. The average annual precipitation is 538 mm with over half the precipitation recieved in the summer months (340 mm). The temperature averages 11.5 ^{0}C in the summer and -6.0 ^{0}C in the winter. These temperatures are milder and not nearly as extreme as the other subregions within the Boreal forest and Foothills natural regions.



Map 1. Location of Upper Foothills subregion in Alberta

Approach and Methods of Classification

Approach: Ecological classification hierarchy and terminology

The system of classification in this guide was initially based on the community type approach of Mueggler (1988). Mueggler's system was chosen over the habitat type approach (Daubenmire 1952) or ecosystem association approach (Corns and Annas 1986) because it could classify plant communities irregardless of their successional status. However, as the philosophy of rangeland health and proper functioning condition of a site evolved, it became apparent (through data analysis) that there was a need to also organize the various plant communities based on their response to disturbance (i.e. disturbance vs. natural succession) within an area under similar environmental influences.

It was determined that the ecosystem classification system developed by Corns and Annas (1986) and Beckingham et al. (1996) could accommodate this additional requirement. Thus, the new system developed for rangelands is a combination of Mueggler (1988) and Beckingham et al. (1996). Consequently, this guide adopts a similar ecological unit classification hierarchy (**ecosite, ecosite phase, plant community**). In an effort to first, link the hierarchical system with the historic rangeland system, and second, to create a provincially standardized rangeland approach, slightly different classification terminology was developed. The new terms **ecological site** and **ecological site phase** (replacing Beckingham et al.'s [1996] ecosite and ecosite phase terms respectively), provide subtle distinction to recognize the blending of the old systems and still be recognizable to readers familiar with the original terminology. See figure 1 for a flow chart of both classification and general presentation of information.

Methods: Plant community classification

Sampling for this guide occurred within the Upper Foothills subregion . This guide outlines the classification of 572 plots described from 1991 to 2003 .

The procedure for inventory of plots followed the Range Survey Manual (1992) and uses the **MF5 form**. A plot consisted of a 10 m x 10 m macroplot and ten randomly selected 1 m x 1 m microplots to record the canopy cover of shrubs and ten nested 20 cm x 50 cm microplots to record the canopy cover of forbs and grass. The data for each site was analyzed using the multivariate analysis techniques of classification and ordination. Classification is the assignment of samples to classes or groups based on the similarity of species. A polythetic agglomerative approach was used to group the samples. This technique assigns each sample to a cluster which has a single measure. It then agglomerates these clusters into a hierarchy of larger and larger clusters until finally a single cluster contains all the samples (Gauch 1982). Cluster analysis was performed in SAS and Euclidean distance was used as the

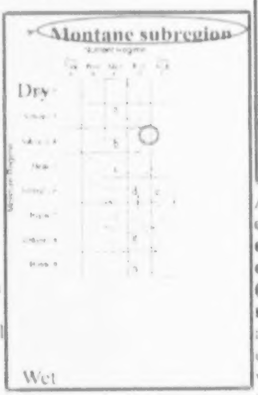
Ecological classification of Alberta

The Rangeland Ecological Classification System is based on the ecological classification system of Alberta. This hierarchial classification structure for Alberta is outlined below starting at the larger scale natural subregions map and going down in scale to the plant community type.

Natural subregions ► **Edatopic grid** ► **Ecological site(Ecosite)** ► **Ecological site phase** ► **Community type**

The province of Alberta is divided into 20 subregions which are **areas of similar landscape and climatic features**. For example the Rocky Mountain subregions are distinguished mainly by differences in environmental conditions associated with elevational changes.

Each subregion is further divided into Ecological sites based on the **moisture nutrient grid** (edatopic grid) outlined below. In the Prairie and Parkland subregions moisture and nutrient grids have not been defined and soil series (AGRASID) maps are being used to divide the subregions.



An ecological site is an ecological unit that **develops under similar environmental influences (climate, moisture, nutrient regime).** Ecosites are groups of one or more ecosite phases that occur within the same portion of the edatopic grid.

An ecological site phase **is a subdivision of the ecosite based on dominant tree, grass, or shrub species.** Ecological site phases generally have a distinct range in tree canopy composition or understorey floristic composition.

Community types **are sub-divisions of the ecosite phase** and are the lowest taxonomic unit in the classification system. **The community type is at the scale that most range management planning occurs.** Detailed guides outlining the various ecological sites, ecosite phases and plant community types are available for most subregions of the province.

Figure 1. Layout of the Ecological Classification System for Alberta

Cluster Distance Measure and Ward's method was used in the Group Linkage Method. The groupings generated in cluster analysis were overlain on the site ordination to determine final groupings. Ordination was used to find relationships among species, communities and environmental variables. Ordination reduces the dimensionality of the data to 1-3 most important axes to which environmental gradients can be assigned. The ordination technique used in the analysis of the data was DECORANA (Detrended Correspondence Analysis). DECORANA detrends and rescales the axes thereby reducing the arching and compression of axes problems associated with other ordination techniques (Reciprocal averaging, Principle Components Analysis). Once final groupings were determined on the ordination specific environmental variables can be assigned to the variation outlined on the ordination axes.

Plant community type summaries were generated in SAS, by averaging plant species composition, range in composition, and percent constancy of occurrence, among vegetation inventory plots which were part of a community type. Environmental data was subsequently sorted into the same plant community groupings to create the plant community descriptions outlined in this guide. The number of sample plots on which the description was based is also provided (e.g. n=16).

Range Management Concepts and Methods

Ecologically sustainable stocking rates

Ecologically sustainable stocking rates (ESSR) values are suggested for each plant community. These values reflect the maximum number of livestock (e.g. hectares(ha)/animal unit month(AUM)) that can be supported by the plant community given inherent biophysical constraints and the ecological goal of sustainable health and proper functioning of the plant community. When the ESSR is multiplied by the area (e.g. ha) of a plant community polygon the result is termed **ecologically sustainable carrying capacity (ESCC)**, and is expressed as AUMs. Often the ESCC must be adjusted for management factors (e.g. reduced livestock distribution), management goals (e.g. improve rangeland health, multiple use and values, etc.), drought conditions, and other natural phenomena impacting the site (e.g. forage quality, fire, pests, etc.). This adjusted/reduced value is the **ecologically sustainable grazing capacity (ESGC)**. The ESGC values are not provided in the plant community guide because the necessary adjustments are determined by the rangeland resource manager.

Suggested ESSR values were determined from a combination of clipping studies, long-term rangeland reference area data, estimated production, and historical grazing experience. In order to sustain ecological health and function of the plant community, the ESSR was based on the allocation of 25 % of total production for forested plant community types, 50 % of total production for grass and shrub land types within the Upper Foothills subregion and the forage requirements one animal unit (i.e. 455 kg of dry matter per month). The remaining biomass production (carry over), is allocated for the maintenance of ecological functions (e.g. nutrient cycling, viable diverse plant communities, hydrological function, and soil protection, etc.) and plant community services (forage production, habitat maintenance, etc.). The allocation of biomass production in this manor is well established, and supported, by the scientific community and the amount required, varies with Natural Subregion (Holechek et al. 1995).

Rangeland Health

Range health is determined by comparing the functioning of ecological processes on an area (e.g. plant community polygon) of rangeland to a standard (i.e. RPC) described within an ecological site description. An ecological site is similar to the concept of **range site**, but a broader list of characteristics are described. An ecological site is defined by the Task Group on Unity and Concepts (1995) as, "*a distinctive kind of land with specific physical characteristics that differs from other kinds of land in its ability to produce a distinctive kind and amount of vegetation*". This guide can be used to determine the appropriate **reference range plant community**, within an ecological site, for a rangeland health assessment.

Rangeland health assessments are utilized to make a rapid determination of the ecological status of rangeland. We use range health terminology (healthy, healthy with problems, or unhealthy), to rank the ability of rangeland to perform certain ecological functions. These functions include: net primary production, maintenance of soil/site stability, capture and beneficial release of water, nutrient and energy cycling and plant species functional diversity. For a detailed description on how to assess rangeland health for various plant communities please refer to "*Rangeland Health Assessment for Grassland, Forest and Tame Pasture*" (Adams et al. 2003). A general range health category (Healthy, Healthy with problems, Unhealthy) has been added to each community type description, which can be used as a guide when doing range health assessments.

Range management objectives tend to favor the later stages of plant succession (late-seral to potential natural community (PNC) or good to excellent range condition) (Adams et al. 2003). Late seral plant communities tend to be superior in the efficient capture of solar energy, in cycling of organic matter and nutrients, in retaining moisture, in supporting wildlife habitat values and in providing the highest potential productivity for the site. In contrast, early seral stages represent plant communities with diminished ecological processes, which are less stable and more vulnerable to erosion and invasion by weeds and non-native species. They also have diminished resource values for livestock forage production, wildlife habitat and watershed protection (Adams et al. 2003). Healthy rangelands perform important ecological functions and provide a broader suite of goods and services. In most cases these late seral plant communities are used as reference range plant community (RPC), but sometimes management goals influence the choice of RPC (e.g. a cut block to be maintained as untimbered rangeland).

How to use the guide

First decide what category the community type is in. If it is in the **Native grass** and **Shrub category** it will not have tree cover and be found on steep south facing slopes or moist lowland areas adjacent to streams and rivers. The predominant species will be native grasses, willow and bog birch. The **Grazing modified** community types will resemble the native shrub and grassland community types, but will show signs of extensive grazing pressure. These community types will be dominated by grazing resistant species Kentucky bluegrass, clover and dandelion. A couple of moderately grazed community types with a predominant native species cover are also found in this category.

The **Deciduous category** will be plant communities dominated by deciduous tree species aspen and balsam poplar and the **Conifer category** will be plant communities dominated by white spruce, lodgepole pine or black spruce tree species.

In order to understand how the community types in this guide are related to the ecosites and ecosite phases outlined in "Ecosites of West-Central Alberta" (Beckingham et al., 1996), the community types in this guide are arranged by ecological site (ecosite) and ecological site phase (ecosite phase) (Table 1). **Ecological sites** are defined as ecological units that develop under similar environmental influences (climate, moisture and nutrient regime). An **ecological site phase** is a subdivision of the ecosite based on the dominant species in the canopy. Table 1 is a reproduction of Figure 14 in the Ecosites of West-Central Alberta guide with the community types in this guide highlighted. For the most part the ecological sites and ecological site phases are the same, particularly for the forested community types, but a number of new ecological sites and ecological site phases had to be created for the grass and shrubland community types (Table 1). These included (ff)(mesic/rich) fescue-california oatgrass ecosite, and the (c5) yellow mtn avens, (c6) hairy wildrye grassland, (ff1)grassland, (ff2) shrubland, (g3) grass meadow and (j2) horsetail Pb ecosite phases. The "Grazing succession" and "Harvesting succession" categories (Table 1) outline the successional sequence the community types will undergo with increased grazing pressure or harvesting. A number of new ecological site phases were created for these categories. These included (c2b) harvested Aw, (c4b) harvested Sw, (e1b) tall bilberry/arnica Pl-Sw harvested, (e3b) tall bilberry/Arnica/Sw, (ff1a) grazed grassland, (ff2a) grazed shrubland, (f4b)bracted honeysuckle Sw harvested, (g2a) grazed forb meadow, (g3a) grazed grass meadow and (j1b) horsetail Sw harvested. All of the new ecological sites and ecological site phases are summarized within this guide.

Results

The analysis of the 572 plots distinguished 73 community types. These types were split into 6 categories:

A.) Native grasslands	(18 types)
B.) Native shrublands	(13 types)
C.) Grazing modified types	(11 types)
D.) Deciduous types	(7 types)
E.) Conifer types	(12 types)
F.) Cutblock types	(12 types)

The dominant plant species, canopy cover, environmental conditions, forage production and carrying capacity are outlined for each community type.

Table 1. Ecosites, ecosite phases and plant community types for the Upper Foothills subregion (adapted from Beckingham et al., 1996) (Highlighted community types are described in this guide, non-highlighted communities are outlined in the guide Ecosites of West-Central Alberta)

Ecological site	Ecological site phase	Forested community type	Reference Range community type	Successional plant communities	Harvesting Succession
a grassland (xeric/poor)	a1 shrubby grassland	a1.1 bearberry grassland	**UFA10 Bearberry/Slender wheatgrass**		
		a1.2 saskatoon-prickly rose grassland	**UFA9 Junegrass-Sedge/Sage**		
b bearberry/lichen (subxeric/poor)	b1 bearberry/lichen Pl	b1.1 Pl /bearberry	**UFE11 Pl/Bearberry/H. wildrye**		
		b1.2 Pl /Labrador tea/lichen			
		b1.3 Pl /bog cranberry			
c hairy wild rye (submesic/medium)	c1 hairy wild rye Pl	c1.1 Pl /Canada buffalo-berry/hairy wild rye			
		c1.2 Pl /green alder/hairy wild rye			
		c1.3 Pl /hairy wild rye			
	c2 hairy wild rye Aw	c2.1 Aw/hairy wild rye	**UFD1 Aw/Rose/Bearberry** **UFD3 Aw/Rose/Hairy wildrye**		**UFF6 Aw/Fireweed** **UFF7 Aw/Blueberry-Bearberry/Hairy wildrye**

	c3 hairy wild rye Aw-Sw-Pl	c3.1 Aw-Sw-Pl /Canada buffalo-berry/hairy wild rye	**UFD4 Aw/Buffaloberry/ Hairy wildrye**		
		c3.2 Aw-Sw-Pl /green alder/hairy wild rye			
		c3.3 Aw-Sw-Pl /hairy wild rye			
	c4 hairy wild rye Sw	c4.1 Sw/Canada buffalo-berry/hairy wild rye	**UFE8 Sw/Bearberry** **UFE9 Sw/Juniper-Buffaloberry**		**UFF1 Juniper/Hairy wildrye** **UFF2 Rose/Hairy wildrye**
	c5 yellow mtn. avens		**UFD2 Pb-Sw/Willow/Yellow Mtn. avens**		
	c6 hairy wildrye grassland		**UFA15 Hairy wildrye-Sedge**		
d Labrador tea-mesic (Mesic/poor)	dl Labrador tea-mesic Pl-Sb	dl.1 Pl-Sb/tall bilberry/feather moss			
		dl.2 Pl-Sb/Labrador tea/feather moss			
		dl.3 Pl-Sb/feather moss			
e tall bilberry/arnica (mesic/medium)	el tall bilberry/ arnica Pl	el.1 Pl /green alder/feather moss			

		e1.2 Pl /tall bilberry/feather moss	**UFE2 Pl-Sw/Bunchberry** **UFE4 Pl/Marsh reedgrass** **UFE1 Pl/Bog cranberry**		**UFF2a Fireweed/Hairy wildrye** **UFF8 Kentucky bluegrass-C. red fescue/Clover** **UFF9 Pl/Hairy wildrye**
		e1.3 Pl /Labrador tea/feather moss			
		e1.4 Pl /fir/feather moss			
		e1.5 Pl /feather moss			**UFF4a Pl-Sw/Moss**
	e2 tall bilberry/ arnica Aw-Sw-Pl	e2.1 Aw-Sw-Pl /green alder/feather moss	**UFD7 Aw-Pl/Bunchberry**		
	e3 tall bilberry/ arnica Sw	e3.1 Sw/green alder/feather moss	**UFE12 Sw/Alder**		**UFF10 Fireweed/ Pinegrass**
		e3.2 Sw/tall bilberry/feather moss			
		e3.3 Sw/Labrador tea/feather moss			
		e3.4 Sw/fir/feather moss			
		e3.5 Sw/feather moss	**UFE10 Sw/Moss**		**UFF4 Sw/Moss**
	e4 tall bilberry/ arnica Fa	e4.1 Fa/tall bilberry/feather moss			
		e4.2 Fa/Labrador tea/feather moss			

		e4.3 Fa/fir/feather moss			
		e4.4 Fa/feather moss			
ff fescue-california oatgrass grassland (mesic/rich)	ff1 grassland		**UFA5 Rough fescue-Tufted hairgrass** **UFA6 Rough fescue-Hairy wildrye** **UFA7 Rough fescue-California oatgrass/Bearberry** **UFA7a California oatgrass-Rough fescue/Bearberry** **UFA8 California oatgrass-Sedge** **UFA12 Rough fescue-Bog sedge** **UFA13 Arctic rough fescue**	**UFC2 Rocky Mtn. fescue/ Graceful cinquefoil** **UFC7 Creeping red fescue/ Clover** **UFC10 Purple oatgrass-Rough fescue** **UFC11Slender wheatgrass-Sedge-Rough fescue** **UFA16 Hairy wildrye-Rough fescue/ Bearberry** **UFA17 Idaho fescue-Parry oatgrass-Sedge**	
	ff2 shrubland		**UFB4 Willow/Rough fescue** **UFB5 Bog birch/Rough fescue/Bearberry** **UFB6 Willow/California oatgrass-Sedge** **UFB8 Willow/Hairy wildrye-Sedge**	**UFC9 Willow/ Kentucky bluegrass**	
f bracted honeysuckle (Subhygric/rich)	f1 bracted honeysuckle Pl	f1.1 Pl /green alder/fern			
		f1.2 Pl /bracted honeysuckle/fern	**UFE3 Pl/Willow/Moss**		
		f1.3 Pl /fir/fern/feather moss			
		f1.4 Pl /fern/feather moss			

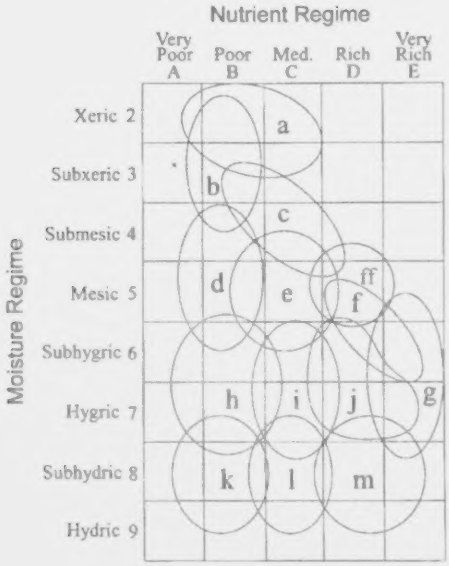
	f2 bracted honeysuckle Pb	f2.1 Pb/green alder-river alder/fern			
		f2.2 Pb/bracted honeysuckle/fern	**UFD5 Aw/Marsh reedgrass**		
	f3 bracted honeysuckle Pb-Sw-Pl	f3.1 Pb-Sw-Pl /green alder-river alder/fern			
		f3.2 Pb-Sw-Pl /fern/feather moss			
	f4 bracted honeysuckle Sw	f4.1 Sw/green alder/fern			**UFF5 River alder-Willow/ Fireweed-Cow parsnip**
		f4.2 Sw/bracted honeysuckle/fern			
		f4.3 Sw/fir/fern/feather moss			
		f4.4 Sw/fern/feather moss			
	f5 bracted honeysuckle Fa	f5.1 Fa/fir/fernfeather moss			
	f6 bracted honeysuckle willow	f6.1 willow/cow parsnip-fern	**UFB12 Alder-Willow/Horsetail**		
g meadow (subhygric/very rich)	g1 shrubby meadow	g1.1 willow/cow parsnip-tall larkspur meadow	**UFB2 Willow/Slender wheatgrass-Sedge** **UFB3 Willow/Tufted hairgrass** **UFB7 Pussy willow**		

		g1.2dwarf birch/tall larkspur meadow	**UFB9 Bog birch/Sedge-Marsh reedgrass** **UFB10 Willow-Bog birch/Sedge** **UFB11 Willow-Bog birch**		
		g1.3buckbrush/cow parsnip meadow			
	g2 forb meadow	g2.1 tall larkspur-avens meadow	**UFA11 Fireweed/Hairy wildrye** **UFA14 C. parsnip-Meadow rue/Fringed brome**	**UFC8 K. bluegrass-Timothy/Meadow rue**	
	g3 grass meadow		**UFA2 Sedge-Slender wheatgrass/Meadow rue** **UFA3 Tufted hairgrass-Sedge** **UFA4 Tufted hairgrass-Sedge-Slender wheatgrass**	**UFC1 Slender wheatgrass-Sedge/Low forbs** **UFC3 Kentucky bluegrass/ Clover Dandelion** **UFC4 Kentucky bluegrass-Sedge/ Dandelion** **UFC5 Tufted hairgrass-Kentucky bluegrass** **UFC6 Sedge/Tufted hairgrass**	
h Labrador tea-subhygric (Subhygric/poor)	hl Labrador tea-subhygric Sb-Pl	hl.1 Sb-Pl /tall bilberry/feather moss			
		hl.2Sb-Pl /Labrador tea/feather moss			

		h1.3 Sb-Pl /feather moss			
i Labrador tea/horsetail (Hygric/medium)	i1 Labrador tea/horsetail Sb-Sw	i1.1 Sb-Sw/Labrador tea/horsetail			
		i1.2 Sb-Sw/Labrador tea/feather moss			
j horsetail (Hygric/rich	j1 horsetail Sw	j1.1 Sw/horsetail	**UFE6 Sw/Horsetail/Moss** **UFE7 Sw/Willow**		**UFF3 Sw/Horsetail/ Kentucky bluegrass**
		j1.2 Sw/feather moss			
	j2 horsetail Pb		**UFD6 Pb/Willow/Horsetail**		
k bog (Subhydric/poor)	k1 treed bog	k1.1 Sb/Labrador tea/cloudberry/peat moss	**UFE5 Sb/Willow**		
	k2 shrubby bog	k2.1 Labrador tea/cloudberry/peat moss	**UFB13 Willow/Sedge-Cottongrass**		
l poor fen (Subhydric/ medium)	l1 treed poor fen	l1.1 Sb-Lt/dwarf birch/sedge/peat moss			
	l2 shrubby poor fen	l2.1 dwarf birch-willow/sedge/peat moss			
	l3 graminoid poor fen	l3.1 sedge/peat moss			
m rich fen (subhydric/rich)	m1 treed rich fen	m1.1 dwarf birch/sedge/golden moss			

	m2 shrubby rich fen	m2.1 dwarf birch/sedge/golden moss	**UFB1 Willow-Bog birch/Water sedge**		
		m2.2willow/sedge/golden moss			
	m3 graminoid rich fen	m3.1 sedge rich fen	**UFA1 Water-Beaked sedge meadow**		

Figure 2. Edatopic grid for the Upper Foothills subregion


Nutrient Regime
Very Poor A
Poor B
Med. C
Rich D
Very Rich E
Moisture Regime
Xeric 2
Subxeric 3
Submesic 4
Mesic 5
Subhygric 6
Hygric 7
Subhydric 8
Hydric 9
a
b
c
d
e
ff
f
g
h
i
j
k
l
m

Ecological sites of the Upper Foothills subregion

a grassland
(xeric/poor)
b bearberry/lichen
(subxeric/poor)
c hairy wildrye
(submesic/medium)
d Labrador tea-mesic
(mesic/poor)
e tall bilberry/arnica
(mesic/medium)
ff fescue-california oatgrass
(mesic/rich)
f bracted honeysuckle
(subhygric/rich)
g meadow
(subhygric/rich)
h Labrador tea-subhygric
(subhygric/poor)
i Labrador tea/horsetail
(hygric/medium)
j horsetail
(hygric/rich)
k bog
(subhydric/poor)
l poor fen
(subhydric/medium)
m rich fen
(subhydric/rich)

c5 Yellow mountain avens (n=1)

CHARACTERISTIC SPECIES

Tree

[7]	Balsam poplar
[5]	White spruce

Shrub

[16]	Yellow mountain avens
[13]	Willow
[9]	Buffaloberry
[3]	Bearberry

Forb

[11]	Alpine hedysarum
[11]	Scouring rush
[4]	Alpine milk vetch

Grasses

[2]	Blunt Sedge

SITE CHARACTERISTICS

Moisture regime: mesic, submesic
Nutrient regime: medium, poor
Topographic position: crest, upper slope, midslope
Slope: level
Aspect: northerly, level

SOIL CHARACTERISTICS

Organic thickness: (6-15), (0-5)
Humus form: mor, moder
Surface texture: SiL, L, CL, LS, C
Effective texture: SCL, CL, SiL, SL, L, C
Depth to Mottles/Gley: none
Drainage: well, moderately well, rapidly
Parent material: M, M/R, GF
Soil subgroup: BR.GL, O.EB, E.EB, O.GL

RANGE PLANT COMMUNITY TYPES

UFD2. Pb-Sw/ Willow/Yellow Mtn. avens n=1

c6 Hairy wildrye grassland (n=1)

CHARACTERISTIC SPECIES

Shrub

[4]	Bearberry

Forb

[5]	Fireweed
[9]	Showy locoweed
[4]	American vetch
[8]	Strawberry
[2]	Graceful cinquefoil

Grasses

[31]	Hairy wildrye
[3]	Arctic bluegrass
[3]	Sedge
[1]	Slender wheatgrass

SITE CHARACTERISTICS

Moisture regime: mesic, submesic
Nutrient regime: medium, poor
Topographic position: crest, upper slope, midslope
Slope: level
Aspect: northerly, level

SOIL CHARACTERISTICS

Organic thickness: (6-15), (0-5)
Humus form: mor, moder
Surface texture: SiL, L, CL, LS, C
Effective texture: SCL, CL, SiL, SL, L, C
Depth to Mottles: Gley: none
Drainage: well, moderately well, rapidly
Parent material: M, M/R, GF
Soil subgroup: BR.GL, O.EB, E.EB, O.GL

RANGE PLANT COMMUNITY TYPES

UFA15. Hairy wildrye-Sedge n=1

c2b Harvested hairy wildrye Aw (n=3)

CHARACTERISTIC SPECIES

Trees	
[1]	White spruce
[7]	Aspen
[1]	Lodgepole pine
Shrub	
[7]	Blueberry
[2]	Bog cranberry
[4]	Prickly rose
[2]	Green alder
Forb	
[18]	Fireweed
[6]	Horsetail
[3]	Heart leaved arnica
Grasses	
[4]	Marsh reedgrass
[1]	Sedge
[4]	Hairy wildrye
[2]	Indian ricegrass

SITE CHARACTERISTICS

Moisture regime: mesic, submesic
Nutrient regime: medium, rich
Topographic position: upper slope, midslope, level
Slope: (3-5)%
Aspect: north, east

SOIL CHARACTERISTICS

Organic thickness: (6-15), (0-5)
Humus form: mor
Surface texture: SiL, L, CL, LS, SiCL, C
Effective texture: SCL, SiCL, CL, SiC, SL, C
Depth to Mottles/Gley: none
Drainage: well, moderately well
Parent material: M, C, X
Soil subgroup: BR.GL, O.MB, O.GL, O.EB, O.DYB, GL.GL, E.EB, D.GL

RANGE PLANT COMMUNITY TYPES

UFF6. Aw/fireweed n=1
UFF7. Aw/Blueberry-Bearberry/Hairy wildrye n=2

c4b Harvested hairy wildrye/ Sw

(n=14)

CHARACTERISTIC SPECIES

Tree

[10]	White spruce
[7]	Balsam poplar
[3]	Aspen

Understory tree

[2]	White spruce
[2]	Balsam poplar
[1]	Aspen

Shrub

[3]	Shrubby cinquefoil
[5]	Rose
[7]	Creeping juniper
[8]	Willow
[3]	Bearberry

Forb

[3]	Showy locoweed
[3]	Northern hedysarum
[5]	Northern bedstraw

Grasses

[3]	Sedge
[21]	Hairy wildrye
[3]	Slender wheatgrass

SITE CHARACTERISTICS

Moisture regime: mesic, submesic
Nutrient regime: medium, poor
Topographic position: upper slope, midslope, level
Slope: (2-10)%
Aspect: southeasterly, southwesterly, south

SOIL CHARACTERISTICS

Organic thickness: (6-15), (0-5)
Humus form: mor
Surface texture: SiL, L, CL, LS, SiCL, C
Effective texture: SCL, SiCL, CL, SiC, SL, C
Depth to Mottles/Gley: none
Drainage: well, moderately well
Parent material: M/R, FL, C/M
Soil subgroup: O.EB, E.EB, BR.GL

RANGE PLANT COMMUNITY TYPES

UFF1. Juniper/Hairy wildrye n=4
UFF2. Rose/Hairy wildrye n=10

e1b Harvested Pl/ Tall bilberry/ Feather moss (n=29)

CHARACTERISTIC SPECIES

Shrub

[1] Rose

Forb

[4] Fireweed
[3] Clover

Grasses

[2] Creeping red fescue
[3] Kentucky bluegrass
[8] Hairy wildrye
[2] Timothy

SITE CHARACTERISTICS

Moisture regime: mesic to subxeric
Nutrient regime: medium, poor
Topographic position: midslope, level, upper slope
Slope: (2-41)%
Aspect: variable

SOIL CHARACTERISTICS

Organic thickness: (0-4)
Humus form: moder
Surface texture: SiL
Effective texture: SiL
Depth to Mottles/Gley: none
Drainage: well, moderately well
Parent material: E, GF
Soil subgroup: O.EB

RANGE PLANT COMMUNITY TYPES

UFF2a. Fireweed/Hairy wildrye n=22
UFF8. Kentucky bluegrass-C. red fescue/Clover n=6
UFF9. Lodgepole pine/Hairy wildrye n=1

e3b Harvested tall bilberry/ Arnica/ Sw (n=6)

CHARACTERISTIC SPECIES

Tree

[3]	White spruce
[10]	Lodgepole pine

Shrub

[1]	Willow
[2]	Bunchberry

Forb

[1]	Fireweed
[5]	Horsetail

Grasses

[6]	Hairy wildrye
[3]	Marsh reed grass

Moss

[1]	Feather moss
[6]	Stair step moss

SITE CHARACTERISTICS

Moisture regime: mesic to subxeric
Nutrient regime: medium, poor
Topographic position: midslope, level, upper slope
Slope: (2-41)%
Aspect: variable

SOIL CHARACTERISTICS

Organic thickness: (0-4)
Humus form: moder,
Surface texture: SiL
Effective texture: SiL
Depth to Mottles/Gley: none
Drainage: well, moderately well
Parent material: E, GF
Soil subgroup: O, EB

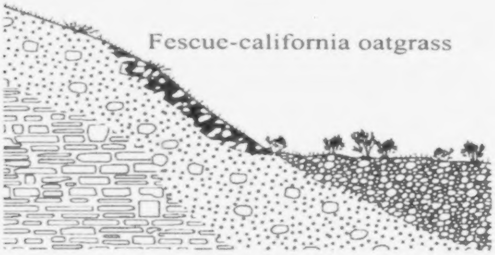
RANGE PLANT COMMUNITY TYPES

UFF4a. Pl-Sw/Moss n=6

ff Fescue-California oatgrass grassland (n=152)

GENERAL DESCRIPTION

This ecosite consists of open grasslands found in valley bottoms, adjacent to rivers and streams, and on south facing slopes. The ecosite tends to be meisc to submesic and occurs on loamy fluvial parent material where flooding and/or high water tables increase soil water content and replenish nutrients. The soils on these sites tend to have thick Ah horizons.



SUCCESSIONAL RELATIONSHIPS

Due to the nature of the site grasslands often remain the climax vegetation on these sites. In the moister lower slope positions shrubs often dominate the site with succession to aspen and spruce. Disturbance regime, cold air drainage, and competition from a diverse cover of shrubs, forbs and grasses slow or inhibit the establishment of trees. If trees do become established, the rich loamy soils usually result in rapid growth.

INDICATOR SPECIES

Rough fescue
California oatgrass
Tufted hairgrass
Bearberry

mesic/rich

SITE CHARACTERISTICS

Moisture regime: mesic, submesic
Nutrient regime: rich, medium
Topographic position: crest, upper, mid to lower slope
Slope: (0-5%) (5-20%)
Aspect: south, southwest

SOIL CHARACTERISTICS

Organic thickness: (0-5)
Humus form: moder, mull
Surface texture: CL, SiL, L
Effective texture: CL, SiL, SL
Depth to Mottles/Gley: none
Drainage: well, moderately well, imperfectly
Parent material: F, C, E, GF
Soil subgroup: O.EB ,O.HR, CU.R

ECOSITE PHASES

ff1grassland (47)
ff2 shrubland (39)
ff1a grazed grassland(65)
ff2a grazed shrubland(1)

ff1 Grassland (n=47)

CHARACTERISTIC SPECIES

Shrub

[3]	Bearberry
[4]	Shrubby cinquefoil

Forb

[1]	Slender blue beard tongue
[1]	Graceful cinquefoil
[9]	Three flowered avens
[2]	Wild strawberry

Grasses

[24]	Rough fescue
[2]	Tufted hairgrass
[4]	Hairy wildrye
[9]	California oatgrass
[19]	Sedge
[6]	Slender wheatgrass
[2]	Alpine rough fescue

SITE CHARACTERISTICS

Moisture regime: mesic, submesic
Nutrient regime: rich
Topographic position: midslope, lowerslope, level
Slope: 5-20%
Aspect: southerly

SOIL CHARACTERISTICS

Organic thickness: (0-5)
Humus form: mull, moder
Surface texture: CL, SiL, L
Effective texture: CL, SiL, SL
Depth to Mottles/Gley: none
Drainage: well, modetately well, imperfectly
Parent material: E, C, F, GF
Soil subgroup: O.HR, O.EB, CU.R

RANGE PLANT COMMUNITY TYPES

UFA5. Rough fescue-Tufted hairgrass n=5
UFA6. Rough fescue-Hairy wildrye n=20
UFA7. Rough fescue-California oatgrass/Bearberry n=5
UFA7a. California oatgrass-Rough fescue/Bearberry n=2
UFA8. California oatgrass-Sedge n=10
UFA12. Rough fescue-Bog sedge n=3
UFA13. Arctic rough fescue n=2

ff2 **Shrubland** (n=39)

CHARACTERISTIC SPECIES

Shrub

[6]	Willow
[17]	Bog birch
[4]	Bearberry

Forb

[1]	Alpine bistort
[5]	Strawberry
[1]	Lindley's aster
[2]	Fireweed

Grasses

[1]	Hairy wildrye
[1]	Sheep fescue
[4]	Sedge
[6]	California oatgrass
[12]	Rough fescue
[1]	Purple oatgrass
[3]	Slender wheatgrass

SITE CHARACTERISTICS

Moisture regime: mesic, subhygric,hygric
Nutrient regime: rich
Topographic position: lowerslope, level
Slope: 0-10%
Aspect: south westerly, north easterly

SOIL CHARACTERISTICS

Organic thickness: (0-4)
Humus form: moder
Surface texture: L
Effective texture: CL
Depth to Mottles/Gley: none
Drainage: well, moderately well
Parent material: L, M
Soil subgroup: O.EB

RANGE PLANT COMMUNITY TYPES

UFB4. Willow/Rough fescue n=3
UFB5. Bog birch/Rough fescue/Bearberry n=24
UFB6. Willow/California oatgrass-Sedge n=8
UFB8. Willow/Hairy wildrye-Sedge n=4

ff1a Grazed grassland (n=65)

CHARACTERISTIC SPECIES

Shrub

[1]	Shrubby cinquefoil
[1]	Bog birch

Forb

[2]	Strawberry
[2]	Yarrow
[1]	Graceful cinquefoil
[19]	Clover

Grasses

[5]	Sedge
[2]	Idaho fescue
[2]	Parry's oatgrass
[32]	Creeping red fescue
[1]	Rocky mountain fescue
[15]	Kentucky bluegrass

SITE CHARACTERISTICS

Moisture regime: mesic, submesic
Nutrient regime: rich
Topographic position: midslope, lowerslope, level
Slope: 5-20%
Aspect: southerly

SOIL CHARACTERISTICS

Organic thickness: (0-5)
Humus form: mull, moder
Surface texture: CL, SiL, L
Effective texture: CL, SiL, SL
Depth to Mottles/Gley: none
Drainage: well, moderately well, imperfectly
Parent material: E, C, F, GF
Soil subgroup: O.HR, O.EB, CU.R

RANGE PLANT COMMUNITY TYPES

UFC2. Rocky Mtn. fescue/Graceful cinquefoil n=1
UFC7. Creeping red fescue/Clover n=26
UFC10. Purple oatgrass-Rough fescue n=2
UFC11. Slender wheatgrass-Sedge-Rough fescue(n=34)
UFA16. Hairy wildrye-Rough fescue/Bearberry n=1
UFA17. Idaho fescue-Parry oatgrass-Sedge n=2

ff2a Grazed shrubland (n=2)

CHARACTERISTIC SPECIES

Shrub

[22]	Willow

Forb

[11]	Dandelion
[7]	Yarrow
[2]	Strawberry
[5]	Tall lungwort
[5]	Clover

Grasses

[12]	Kentucky bluegrass
[5]	Sheep fescue
[9]	Slender wheatgrass
[8]	Tufted hairgrass

SITE CHARACTERISTICS

Moisture regime: mesic, subhygric,hygric
Nutrient regime: rich
Topographic position: lowerslope, level
Slope: 0-10%
Aspect: south westerly, north easterly

SOIL CHARACTERISTICS

Organic thickness: (0-4)
Humus form: moder
Surface texture: L
Effective texture: CL
Depth to Mottles/Gley: none
Drainage: well, moderately well
Parent material: L, M
Soil subgroup: O.EB

RANGE PLANT COMMUNITY TYPES

UFC9. Willow/Kentucky bluegrass n=2

f4b Harvested bracted honeysuckle/ Sw (n=1)

CHARACTERISTIC SPECIES

Tree

[3]	White spruce
[5]	Aspen

Shrub

[5]	Willow
[5]	River alder

Forb

[21]	Fireweed
[13]	Cow parsnip
[10]	Stinging nettle
[10]	White geranium
[8]	Tall lungwort
[6]	Horsetail

Grasses

[4]	Slender wheatgrass
[3]	Marsh reedgrass

SITE CHARACTERISTICS

Moisture regime: subhygric, mesic
Nutrient regime: rich
Topographic position: midslope, upper slope, level
Slope: (20)%
Aspect: southeasterly

SOIL CHARACTERISTICS

Organic thickness: (6-15), (16-25)
Humus form: raw moder
Surface texture: Si, L, SiL, SiCL, SiC
Effective texture: C, SiCL, SiC, Si, L, CL
Depth to Mottles/Gley: none
Drainage: Moderately well, imperfectly
Parent material: M, L, E, C/M
Soil subgroup: D.GL, O.GL, E.EB, E.DYB

RANGE PLANT COMMUNITY TYPES

UFF5. River alder-Willow/Fireweed-Cow parsnip
n=1

g2a Grazed forb meadow (n=4)

CHARACTERISTIC SPECIES

Shrub

[2]	Willow

Forb

[13]	Dandelion
[7]	Cow parsnip
[5]	Clover
[7]	Veiny meadow rue

Grasses

[7]	Slender wheatgrass
[2]	Smooth brome
[17]	Timothy
[22]	Kentucky bluegrass

SITE CHARACTERISTICS

Moisture regime: submesic, subhygric
Nutrient regime: medium, rich
Topographic position: midslope, level
Slope: (0-6)%
Aspect: southeast, southwest

SOIL CHARACTERISTICS

Organic thickness: (6-15)
Humus form: mull
Surface texture: SiC, SiL, C
Effective texture: SiC, C
Depth to Mottles/Gley: none
Drainage: moderately well, imperfectly
Parent material: L, F

Soil subgroup: R.G, O.R

RANGE PLANT COMMUNITY TYPES

UFC8. K. Bluegrass-Timothy/Meadow rue(n=4)

g3 Grass meadow (n=59)

CHARACTERISTIC SPECIES

Shrub

[1]	Barclay's willow
[2]	Willow
[2]	Bog birch

Forb

[7]	Lindley's aster
[8]	Yarrow
[8]	Veiny meadow rue
[5]	Graceful cinquefoil
[6]	Wild strawberry

Grasses

[36]	Sedge species
[3]	Slender wheatgrass
[25]	Tufted hairgrass

SITE CHARACTERISTICS

Moisture regime: mesic, subhygric,hygric
Nutrient regime: very rich
Topographic position: lowerslope, level
Slope: 0%, 5-40%
Aspect: south westerly, south easterly, south and east

SOIL CHARACTERISTICS

Organic thickness: (0-5)
Humus form: moder
Surface texture: SiL, L
Effective texture: SiL, LS, L
Depth to Mottles/Gley: none
Drainage: well, moderately well
Parent material: GL, GF, F
Soil subgroup: O.DYB, O.HR

RANGE PLANT COMMUNITY TYPES

UFA2. Sedge-Slender wheatgrass/Meadow rue n=3
UFA3. Tufted hairgrass-Sedge n=47
UFA4. Tufted hairgrass-Sedge-Slender wheatgrass n=9

g3a Grazed grass meadow (n=93)

CHARACTERISTIC SPECIES

Shrub

[1] Willow

Forb

[4] Strawberry
[8] Yarrow
[9] Graceful cinquefoil
[15] Dandelion
[5] Clover
[7] Veiny meadow rue

Grasses

[21] Sedge species*
[7] Slender wheatgrass
[8] Tufted hairgrass
[28] Kentucky bluegrass
[1] Fringed brome

SITE CHARACTERISTICS

Moisture regime: mesic, subhygric,hygric
Nutrient regime: very rich
Topographic position: lowerslope, level
Slope: 0%, 5-40%
Aspect: south westerly, south easterly, south and east

SOIL CHARACTERISTICS

Organic thickness: (0-5)
Humus form: moder
Surface texture: SiL, L
Effective texture: SiL, LS, L
Depth to Mottles/Gley: none
Drainage: moderately well, poor
Parent material: GL, GF, F
Soil subgroup: O.DYB, O.HR

RANGE PLANT COMMUNITY TYPES

UFC1. Slender wheatgrass-Sedge/Low forbs n=10
UFC3. Kentucky bluegrass/Dandelion n=23
UFC4. Kentucky bluegrass-Sedge/Dandelion n=33
UFC5. Tufted hairgrass-Kentucky bluegrass n=13
UFC6. Sedge/Tufted hairgrass n=14

j2 Horsetail Pb (n=1)

CHARACTERISTIC SPECIES

[35]	Balsam poplar
[5]	Aspen
[3]	White spruce

Shrub

[30]	Willow
[3]	Rose

Forb

[12]	Horsetail
[9]	Scouring rush
[3]	Tall lungwort
[1]	Scouring rush
[4]	Clover
[7]	Strawberry

Grasses

[1]	Hairy wildrye
[1]	Marsh reedgrass
[1]	Kentucky bluegrass

SITE CHARACTERISTICS

Moisture regime: hygric, subhygric, subhydric
Nutrient regime: rich, very rich, medium, poor
Topographic position: toe, midslope, lowerslope, level
Slope: level, (2-%)
Aspect: level, northerly, westerly

SOIL CHARACTERISTICS

Organic thickness: (6-15)(0-5)
Humus form: raw moder, mor, peatymor
Surface texture: SiL, L, SL
Effective texture: SiL, LS, L
Depth to Mottles/Gley: none, (26-50)(0-25)
Drainage: imperfect, poor, moderately well
Parent material: F, C
Soil subgroup: R.G, O.R, O.EB, GL.EB

RANGE PLANT COMMUNITY TYPES

UFD6. Pb/Willow/Horsetail (n=1)

j1b Harvested horsetail/ Sw (n=1)

CHARACTERISTIC SPECIES

Forb

[18]	Dandelion
[3]	Strawberry
[22]	Yarrow
[8]	Graceful cinquefoil
[5]	Veiny meadow rue

Grasses

[4]	Creeping red fescue
[4]	Slender wheatgrass
[46]	Kentucky bluegrass

SITE CHARACTERISTICS

Moisture regime: hygric, subhygric
Nutrient regime: rich
Topographic position: level, midslope, lower slope, toe
Slope: (1)%
Aspect: north

SOIL CHARACTERISTICS

Organic thickness: (6-15), (0-5)
Humus form: mor, raw moder, peatymor
Surface texture: SiL, SL, L
Effective texture: SiL, LS, L
Depth to Mottles/Gley: none
Drainage: imperfectly, moderately well, poor, very poor
Parent material: F, C
Soil subgroup: R.G, O.R, O.EB, GL.EB

RANGE PLANT COMMUNITY TYPES

UFF3. Sw/Horsetail/Kentucky bluegrass(n=1)

UPPER FOOTHILLS SUBREGION

NATIVE GRASSLANDS AND SHRUBLANDS

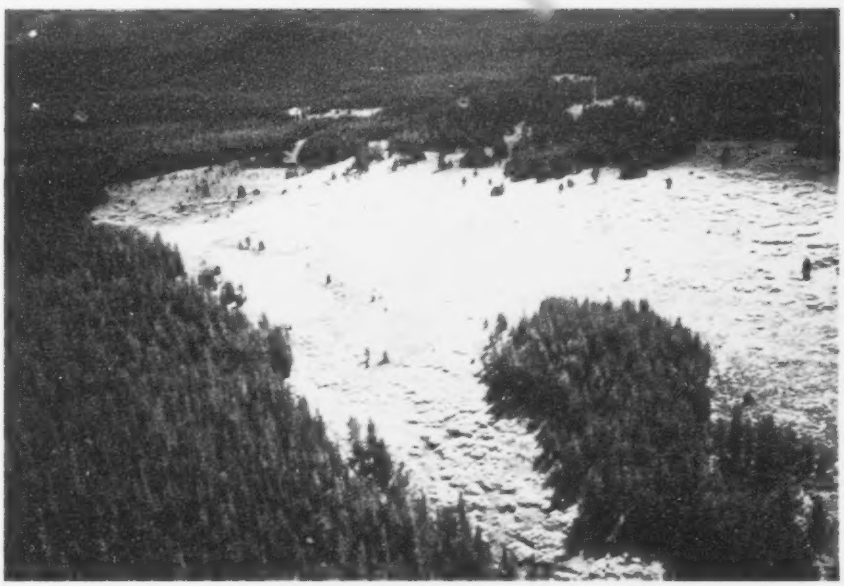


Figure 3. Overview of native shrub and grassland complex in the Upper Foothills subregion

Native grass and shrublands

The native grass and shrubland community types (Table 2) are found in the valley bottoms, adjacent to streams and rivers, throughout the Upper Foothills subregion. Deep snow accumulations and cold air drainage prevent trees from growing in these valley bottoms (Daubenmire, 1978). Historically, these grass and shrublands burned frequently, further preventing tree encroachment.

The sequence of these community types along a moisture gradient from wet (UFA1 sedge meadows) to dry (UFA9 junegrass-sedge/ sage slopes) is outlined in Figure 5. The change in species composition from the wet sedge meadows to rough fescue and California oatgrass meadows may occur over a 3 foot elevational gradient.

The maintenance of these grassland community types is extremely fire dependent. The lack of fire allows bog birch and willow to expand, shading the modal grassland community types. Prolonged shading causes the understory composition to shift from a tufted hairgrass-rough fescue dominated understory to one dominated by slender wheatgrass and sedge (Figure 5). Under heavy shrub cover (pussy willow shrubland and willow-bog birch community types), there is little forb or grass understory. Increased shrub cover also causes a decline in forage productivity and reduces the accessibility for livestock.

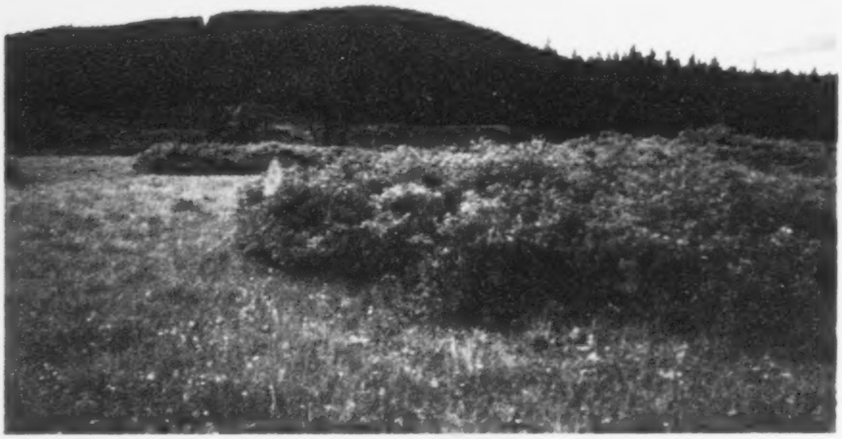


Figure 4. Typical native shrub and grassland transition zone in Upper Foothills subregion

Table 2. Forage production and ecological site phases of the native grass and shrubland community types for the Upper Foothills subregion

Community number	Community type	Productivity (kg/ha)				Moisture	Drainage	Carrying capacity (Ha/AUM)
		Grass	Forb	Shrub	Total			
a1 Ecological site phase shrubby grassland		**400**	**286**		**824**	**Subxeric**	**Rapidly**	**Non-use**
UFA9.	Junegrass-Sedge/ Sage	400		171	1147	Subxeric	Rapidly	Non-use
UFA10.	Bearberry/ Slender wheatgrass	400		100	500	Submesic	Well	Non-use
c6 Ecological site phase hairy wildrye grassland		**1115**	**312**	**8**	**1209**	**Submesic**	**Mod. Well**	**2.1**
UFA15.	Hairy wildrye-Sedge	222	66	8	296	Submesic	Well	3.1
UFA16.	Hairy wildrye-Bearberry	2008	557		2121	Mesic	Mod. Well	1.0
ff1 Ecological site phase grassland		**1185**	**415**	**79**	**1585**	**Mesic**	**Well**	**0.9**
UFA5.	Rough fescue-Tufted hairgrass	1068	618		1684	Subhygric	Mod. Well	0.5
UFA6.	Rough fescue-Hairy wildrye	2558	358		2595	Mesic	Well	0.4
UFA7.	Rough fescue-Bearberry	1023	538		1561	Submesic	Well	0.6
UFA7a	California oatgrass-Rough fescue/ Bearberry	1023	538		1561*	Submesic	Well	Non-use
UFA8.	California oatgrass-Sedge	1051	373	585	1578	Mesic	Well	0.6
UFA12.	Rough fescue-Bog sedge	966	149		1115	Mesic	Well	0.8
UFA13.	Arctic Rough fescue	743	372		1115	Subhygric	Mod. Well	0.8
UFA17	Idaho fescue-Parry's oatgrass-Sedge	1053	372	44	1467*	Mesic	Well	3.1
ff2 Ecological site phase shrubland		**790**	**276**	**273**	**1346**	**Subhygric**	**Mod. Well**	**0.7**
UFB4.	Willow-Bog birch/ Rough fescue	600	200	150	950	Subhygric	Mod. Well	1.0
UFB5.	Bog birch/ Rough fescue/ Bearberry	1173	212	369	1569	Subhygric	Well	0.6
UFB6.	Willow-Bog birch/ California oatgrass-Sedge	598	418	300	1316	Subhygric	Mod. well	0.7
UFB8.	Willow-Bog birch/ Hairy wildrye-Sedge				1550	Subhygric	Mod. well	0.5
f6 Ecological site phase bracted honeysuckle willow		**162**	**1786**		**1948**	**Hygric**	**Imperfectly**	**Non-use**
UFB12	Alder-Willow/ Horsetail	162	1786		1948	Hygric	Imperfectly	Non-use

g1 Ecological site phase shrubby meadow		**1148**	**437**	**566**	**1487**	**Subhygric**	**Mod. Well**	**Non-use**
UFB2.	Willow/ Slender wheatgrass-Sedge	1573	735		1669	Subhygric	Well	0.5
UFB3.	Willow-Bog birch/ Tufted hairgrass	724	523	408	1754	Subhygric	Mod. Well	0.5
UFB7.	Pussy willow shrubland				181	Subhygric	Mod. well	Non-use
UFB9.	Bog birch/ Sedge-Marsh reedgrass	796	58	322	1176	Hygric	Imperfectly	Non-use
UFB10.	Willow-Bog birch/ Sedge	543	395	425	1181	Hygric	Imperfectly	0.8
UFB11.	Willow-Bog birch	1265	811	438	2105	Subhygric	Imperfectly	Non-use
g2 Ecological site phase forb meadow		**200**	**1154**	**400**	**3126**	**Subhygric**	**Mod. well**	**0.7**
UFA11.	Fireweed/ Hairy wildrye				1252	Subhygric	Mod. Well	0.7
UFA14.	Cow parsnip-Meadow rue/ Fringed brome				5000	Subhygric	Mod. Well	0.7
g3 Ecological site phase grass meadow		**1584**	**730**	**50**	**2380**	**Subhygric**	**Mod. Well**	**0.4**
UFA2.	Sedge-Slender wheatgrass/ Meadow rue				2500*	Subhygric	Mod. Well	0.4
UFA3.	Tufted hairgrass-Sedge	1803	622	37	2330	Subhygric	Mod. Well	0.4
UFA4.	Tufted hairgrass-Sedge-Slender wheatgrass	1612	894		2506	Sughygric	Mod. Well	0.4
k2 Ecological site phase shrubby bog		**772**	**126**	**228**	**1148**	**Subhydric**	**Poorly**	**Non-use**
UFB13	Willow/Sedge-Cottongrass	772	126	228	1148	Subhydric	Poorly	Non-use
m2 Ecological site phase shrubby rich fen		**1325**	**126**	**732**	**2105**	**Subhydric**	**Poorly**	**Non-use**
UFB1.	Willow-Bog birch/ Water sedge	1325	126	732	2105	Subhydric	Poorly	Non-use
m3 Ecological site phase graminoid rich fen		**1981**	**384**	**872**	**2381**	**Subhydric**	**Poorly**	**Non-use**
UFA1.	Water sedge meadows	1981	384	872	2381	Subhydric	Poorly	Non-use

* Estimated

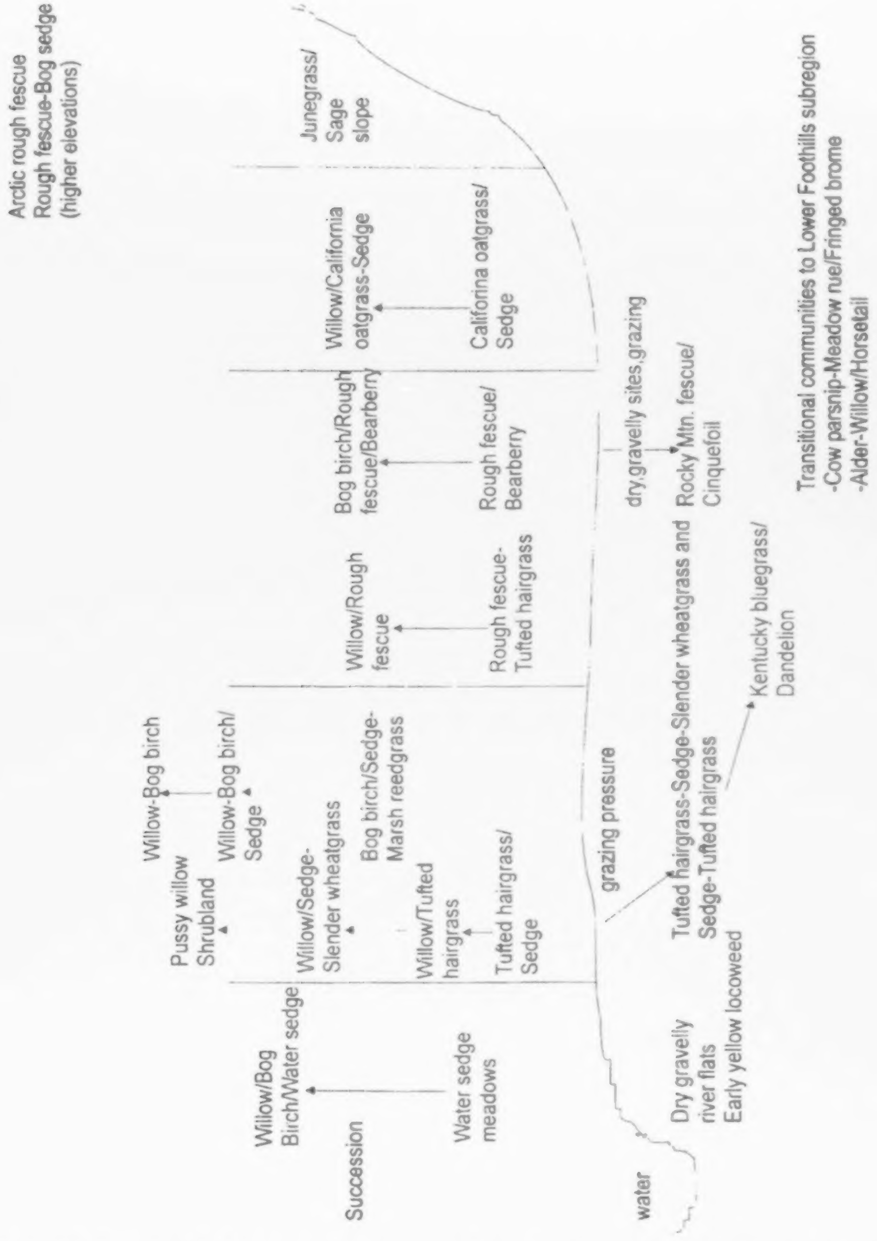

water
Succession
Willow/Bog Birch/Water sedge
Water sedge meadows
Dry gravelly river flats
Early yellow locoweed
Pussy willow Shrubland
Willow-Bog birch
Willow-Bog birch/ Sedge
Willow/Sedge- Slender wheatgrass
Bog birch/Sedge- Marsh reedgrass
Willow/Tufted hairgrass
Tufted hairgrass/ Sedge
grazing pressure
Tufted hairgrass-Sedge-Slender wheatgrass and Sedge-Tufted hairgrass
Kentucky bluegrass/ Dandelion
Willow/Rough fescue
Rough fescue- Tufted hairgrass
Bog birch/Rough fescue/Bearberry
Rough fescue/ Bearberry
dry,gravelly sites,grazing
Rocky Mtn. fescue/ Cinquefoil
Willow/California oatgrass-Sedge
California oatgrass/ Sedge
Junegrass/ Sage slope
Arctic rough fescue
Rough fescue-Bog sedge (higher elevations)
Transitional communities to Lower Foothills subregion
-Cow parsnip-Meadow rue/Fringed brome
-Alder-Willow/Horsetail

Figure 5. Layout of plant community types for native grass and shrublands in the landscape of the Upper Foothills subregion

Key to Grassland Community Types (Grasslands dominated by native species)

1. Hydric, periodic flooding, depressional, dominated by sedges . . . . UFA1 Water sedge meadows
Drier, ungrazed or lightly grazed dominated by forbs or grass (rough fescue, tufted hairgrass) 2
2. Moist sites dominated by Forbs (Fireweed, Cow parnsip) 3
Grass dominated(upland sedges, rough fescue, slender wheatgrass, hairy wildrye, tufted hairgrass) 4
3. Moist, lowland sites dominated by fireweed . . . . UFA11 Fireweed/ Hairy wildrye (Forb meadow)
Fine textured, silty soils, dominated by cow parsnip . . . . UFA14 Cow parsnip-Meadow rue/ Fringed brome
4. Moist sites dominated by Tufted hairgrass with no rough fescue present at site, includes moderately grazed sites dominated by slender wheatgrass, Rocky Mtn. fescue and sedge species 5
Drier sites dominated by rough fescue, hairy wildrye, california oatgrass, slender wheatgrass 6
5. Early successional sites with little slender wheatgrass, dominated by Tufted hairgrass . . . . UFA3 Tufted hairgrass-Sedge
Later successional or grazed tufted hairgrass or rough fescue meadows with abundant forbs, sedge, and slender wheatgrass 5a
5a Lightly grazed sites dominated by tufted hairgrass, Sedge and Slender wheatgrass.... ....UFA4 Tufted hairgrass-Sedge-Slender wheatgrass
Lightly to moderately grazed sites dominated by sedge, slender wheatgrass, Rocky Mtn. fescue or graceful cinquefoil...5b
5b Moderately to heavily grazed site dominated by Rocky Mtn. fescue or graceful cinquefoil.................................UFC2 Rocky Mtn. fescue/Graceful cinquefoil
Lightly to moderately grazed site dominated by slender wheatgrass, sedge, low forb species or rough fescue 5c
5c Dry well drained sites with some rough fescue present................UFC11Sedge-Slender wheatgrass-Rough fescue
Moister sites, tufted hairgrass present.........................UFC1 Slender wheatgrass-Sedge/Low forbs
6. Rough fescue dominated, higher elevation and moist sites 7
Hairy wildrye, California oatgrass, slender wheatgrass, Idaho fescue, Parry oatgrass or Purple oatgrass dominated 12
7. Moist Alpine sites with globeflower, fleabane, monkshood, mountain heliotrope or drier sites with bog sedge . . 8
Drier sites at lower elevations tufted hairgrass, hairy wildrye, bearberry or slender wheatgrass codominant . . . 9
8. Dry well drained sites with bog sedge codominant . . . . UFA12 Rough fescue-Bog sedge
Moist Alpine sites with alpine forb species . . . . UFA13 Alpine rough fescue
9.Moist sites codominated with Tufted hairgrass . . . . UFA5 Rough fescue-Tufted hairgrass
Drier well drained sites dominated by hairy wildrye, bearberry, ... 10
10. Lower, south facing slopes, well-developed soils hairy wildrye codominant UFA6 Rough fescue-Hairy wildrye
Well drained sites with Bearberry present in understory 11
11. Shallow, well drained, gravelly soils, low nutrient . . . . UFA7 Rough fescue/ Bearberry
Ghost area California oatgrass dominated . . . . UFA7a California oatgrass-Rough fescue/ Bearberry
12. California oatgrass dominated, well-drained soil, cold air drainage level areas in valley bottoms . . . . UFA8 California oatgrass-Sedge
Idaho fescue, Parry oatgrass, Hairy wildrye or Purple oatgrass dominated communities on south facing slopes or dry gravelly river beds 13
13. Low land moist meadows or dry gravelly river beds 15
Steep south facing slopes...14
14. Steep, south facing slopes, shallow soils, drought tolerant species Junegrass, sage UFA9 Junegrass-Sedge/ Sage
Hairy wildrye or Idaho fescue, Purple oatgrass, Parry oatgrass dominated sites 16
15. River bed, dry, gravelly, well drained sites . . . . UFA10 Bearberry/ Slender wheatgrass
Moist meadows dominated by drier sedge species . . . . UFA2 Sedge-Slender wheatgrass/ Meadow rue
16. Hairy wildrye dominated 17
Moister, south facing slopes in the Ghost area, Idaho fescue, Parry oatgrass, Purple oatgrass dominated grasslands 16a

16a Idaho fescue, Parry oatgrass dominated sites in the Ghost area................UFA17 Idaho fescue-P.oatgrass-Sedge

Grazed sites dominated by Purple oatgrass and rough fescue................UFC9 Purple oatgrass-Rough fescue
17. South facing slopes, at higher elevation..UFA15 Hairy wildrye-Sedge
Grazed site, dominated by hairy wildrye, rough fescue present . . UFA16 Hairy wildrye-Rough fescue/Bearberry

Key to Grazing Modified Grassland and Shrubland Community Types (dominated or co-dominated by non-native species)

1. Native dominated 2
Non-native dominated, creeping red fescue, Kentucky bluegrass, clover, dandelion . . . 6
2. Grass dominated (slender wheatgrass, rocky mtn. fescue, sedge, purple oatgrass, tufted hairgrass) 3
Shrub dominated with K. bluegrass understory . . . . UFC10 Willow/ Kentucky bluegrass
3. Moist grassy meadows with rough fescue, tufted hairgrass still present on site 4
Drier, well drained sites dominated by Rocky mtn. fescue
. . . . UFC2 Rocky mtn. Fescue/ Graceful cinquefoil

4 Slender wheatgrass, Sedge and purple oatgrass dominated community...........................4a
Grazed tufted hairgrass communities(moister sites)..5
4a Slender wheatgrass and Sedge dominated.......UFC1 Slender wheatgrass-Sedge/Low forbs
Purple oatgrass dominates.......................UFC9 Purple oatgrass-Rough fescue

5. Kentucky bluegrass present . . . . UFC5 Tufted hairgrass-Kentucky bluegrass
Kentucky bluegrass absent, recovering site . . . . UFC6 Sedge-Tufted hairgrass

6. Kentucky bluegrass dominated 7
Seeded sites with Creeping red fescue . . . . UFC7 Creeping red fescue/ Clover

7. Heavily grazed sites with dandelion as co-dominant . . . .
. . . . UFC3 Kentucky bluegrass/ Dandelion
Heavily grazed cow parsnip meadow, lower elevation sites, cow parsnip present in small amounts... UFC8 Kentucky bluegrass-Timothy/ Meadow rue

Key to Shrubland Community Types

1. Bog birch dominated 2
Willow and Bog birch dominated 3

2. Dry, nutrient poor soils, with rough fescue . . . . . . UFB5 Bog birch/ Rough fescue/ Bearberry
Wet, poor drainage, no willow cover . . . . UFB9 Bog birch/ Sedge-Marsh reedgrass

3. Poorly drained sites with water sedge in understory, or shrublands with little understory . . . 4
Drier well drained sites with slender wheatgrass, hairy wildrye, rough fescue, tufted hairgrass found in the understory 7

4. Poor drainage, very wet sites...4a
Shrub dominated sites with little understory willow and bog birch dominated 5

4a Richer sites dominated by sedge..................................UFB1 Willow-Bog birch/Water sedge
Poor nutrient boggy sites dominated by cottongrass......UFB13 Willow/Sedge-Cottongrass

5. Tall willow or alder dominated 6
Short willow, imperfectly drained sites little understory . . . . UFB11 Willow-Bog birch

6. Occurring along water bodies . . . . UFB7 Pussy willow shrubland
Moist, nutrient rich seepage sites with alder and willow . . . . UFB12 Alder-Willow/ Horsetail

7. Well drained sites with Hairy wildrye dominating the understory, typical of well drained valley bottomland sites . . . . UFB8 Willow-Bog birch/ Hairy wildrye-Sedge
Recently invaded grasslands with rough fescue, tufted hairgrass or california oatgrass, slender wheatgrass or graceful sedge 8

8. California oatgrass dominated . . . . UFB6 Willow-Bog birch/ California oatgrass-Sedge
Rough fescue or tufted hairgrass, graceful sedge or slender wheatgrass present in understory 9

9. Rough fescue dominated . . . . UFB4 Willow-Bog birch/ Rough fescue
Tufted hairgrass, graceful sedge or slender wheatgrass dominated 10

10. Tufted hairgrass dominated . . . . UFB3 Willow-Bog birch/ Tufted hairgrass
Sedge or Slender wheatgrass dominated understory..11
11. Graceful sedge dominated . . . . UFB10 Willow-Bog birch/ Sedge
Slender wheatgrass dominated . . . . UFB2 Willow/ Slender wheatgrass-Sedge

UFA1. Water-Beaked sedge meadows

(Carex aquatilis-Carex rostrata)

n=15 Wet conditions and periodic flooding result in the formation of water sedge meadows. Bog birch and willow will invade into the drier edges of these meadows to form the willow-bog birch/ water sedge community type (UFB1).

These community types are quite productive, producing nearly 2000 kg/ha of forage, but the high water table in the spring and summer when these meadows are most palatable limits livestock use. A study in the Yukon found that crude protein on these meadows declined from a high of 10% in May to less than 5% in September (Bailey et al., 1992). As a result, these meadows would be rated as secondary or non-use range.

PLANT COMPOSITION CANOPY COVER(%)

	MEAN	RANGE	CONST.
SHRUBS			
WILLOW			
(Salix spp)	2	0-10	79
BOG BIRCH			
(*Betula glandulosa*)	1	0-1	20
FORBS			
ARROW LEAVED COLTSFOOT			
(Petasites sagittatus)	1	0-20	7
GRASSES			
WATER SEDGE			
(Carex aquatilis)	13	0-63	27
BEAKED SEDGE			
(*Carex rostrata*)	2	0-30	7
SEDGE			
(*Carex spp*)	49	0-96	67
TUFTED HAIRGRASS			
(Deschampsia cespitosa)	11	0-40	86

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
SUBHYDRIC
NUTRIENT REGIME
MESOTROPHIC
ELEVATION:
1091-1760 M (1484 M)
SOIL DRAINAGE:
POORLY
ASPECT:
VARIABLE
SLOPE:
0-5%

FORAGE PRODUCTION(KG/HA)

GRASS: 1981 (810-4438)
FORBS: 384 (46-776)
SHRUBS: 872 (8-1736)
TOTAL: 2287 (966-4684)

ECOLOGICALLY SUSTAINABLE STOCKING RATE
NON-USE

UFA2. Sedge-Slender wheatgrass/ Meadow rue

(Carex spp.-Agropyron trachycaulum/ Thalictrum venulosum)

n=3 These sites are dominated by three sedge species that are adapted to moist conditions: *C. praticola, C. praegracilis* and *C. prairea*. The presence of small amounts of tufted hairgrass and rough fescue indicates that these sites may represent a phase of the rough fescue-tufted hairgrass plant community (UFA5). Past heavy grazing pressure may have shifted the plant community to one dominated by sedge species or these sites could be too wet for tufted hairgrass and rough fescue growth.

The forage productivity on this community type is good. In comparison with the water sedge meadows (UFA1), these sites remain drier throughout the growing season and this allows easy access for livestock. This community would be rated as primary range.

PLANT COMPOSITION

	CANOPY COVER(%)		
	MEAN	RANGE	CONST.
SHRUBS			
SHRUBBY CINQUEFOIL			
(Potentilla fruticosa)	1	0-2	67
BOG BIRCH			
(Betula glandulosa)	1	0-2	33
FORBS			
VEINY MEADOW RUE			
(Thalictrum venulosum)	28	20-36	100
OLD MAN'S WHISKERS			
(Geum triflorum)	9	0-14	67
SLENDER BLUE BEARDTONGUE			
(Penstemon procerus)	5	0-8	67
YARROW			
(Achillea millefolium)	10	5-14	100
SILVERY CINQUEFOIL			
(Potentilla arguta)	5	0-8	67
LINDLEY'S ASTER			
(Aster ciliolatus) 2	0-5	33	
GRASSES			
MEADOW SEDGE			
(Carex praticola)	16	0-26	67
GRACEFUL SEDGE			
(*Carex praegracilis*)	11	0-32	33
PRAIRIE SEDGE			
(Carex prairea)	9	0-28	33
SEDGE			
(*Carex spp*)	25	0-75	33
SLENDER WHEATGRASS			
(Agropyron trachycaulum)	8	0-12	67

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
SUBHYGRIC
NUTRIENT REGIME:
PERMESOTROPHIC
ELEVATION:
1460 M
SOIL DRAINAGE:
MODERATELY WELL
ASPECT:
EAST
SLOPE:
0-5%

FORAGE PRODUCTION(KG/HA)

TOTAL: 2500

ECOLOGICALLY SUSTAINABLE STOCKING RATE
0.4 HA/AUM OR 0.8 ACRES/AUM

UFA3. Tufted hairgrass-Sedge

(Deschampsia cespitosa-Carex praegracilis)

n=48 This community is located on moist sites that are better drained and slightly drier than the pure sedge meadows (UFA1). Willoughby (1992) and Willoughby and Alexander (2003), found that tufted hairgrass is a common plant species on these lowland sites throughout the Upper Foothills and Lower Subalpine subregions. At lower elevations, this species appears to be replaced by marsh reedgrass. When this community type is protected from grazing for 25-30 years, willow and bog birch expand (willow/ tufted hairgrass (UFB3)) and tufted hairgrass and sedge decline (Willoughby, 1992). The decline in graminoid cover also results in a decline in available forage production from 2200 to 1800 kg/ha. Continuous heavy grazing pressure causes hairgrass to decline and the site will be invaded by Kentucky bluegrass and dandelion.

Bork (1994), found this community type. to be the most productive type described in Willmore wilderness park. Forage production averages over 2000 kg/ha and can vary from 800-3300 kg/ha. This community type would be rated as primary range.

PLANT COMPOSITION CANOPY COVER(%)

	MEAN	RANGE	CONST.
SHRUBS			
BARCLAY'S WILLOW *(Salix barclayi)*	1	0-8	17
WILLOW *(Salix spp)*	1	0-12	17
BOG BIRCH *(Betula glandulosa)*	1	0-15	25
FORBS			
YARROW *(Achillea millefolium)*	7	0-41	96
STRAWBERRY *(Fragaria virginiana)*	5	0-27	72
VEINY MEADOW RUE *(Thalictrum venulosum)*	5	0-23	75
LINDLEY'S ASTER *(Aster ciliolatus)*	8	0-44	68
GRACEFUL CINQUEFOIL *(Potentilla gracilis)*	7	0-23	89
DANDELION *(Taraxacum officinale)*	4	0-30	68
GRASSES			
TUFTED HAIRGRASS *(Deschampsia cespitosa)*	34	2-70	100
GRACEFUL SEDGE *(Carex praegracilis)*	9	0-43	49
WATER SEDGE *(Carex aquatilis)*	1	0-20	11
SEDGE *(Carex spp)*	10	0-88	38
SLENDER WHEATGRASS *(Agropyron trachycaulum)*	7	0-27	75

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
SUBHYGRIC
NUTRIENT REGIME:
PERMESOTROPHIC
ELEVATION:
1276-1800 M (1461 M)
SOIL DRAINAGE:
MODERATELY WELL
ASPECT:
VARIABLE
SLOPE:
0-40%(4%)

FORAGE PRODUCTION(KG/HA)

GRASS: 1803(422-3654)
FORBS: 122 (6-1577)
SHRUBS: 37 (0-414)
TOTAL: 2330 (824-3706)

ECOLOGICALLY SUSTAINABLE STOCKING RATE
0.4 HA/AUM OR 0.9 ACRES/AUM

UFA4. Tufted hairgrass-Sedge-Slender wheatgrass

(Deschampsia cespitosa-Carex spp.-Agropyron trachycaulum)

n=9 This community type may be transitional between the willow dominated community types and the tufted hairgrass dominated grasslands. Two of the sites described in this community are represented by the inside, ungrazed transect at two rangeland reference area sites. Protection from grazing for 25-35 years appears to allow willow to expand and there is a shift away from a tufted hairgrass dominated community type to a type that is dominated by slender wheatgrass, sedge and tall forb species. Continued protection from grazing and fire will likely lead to a community dominated by willow and bog birch with little understory of forbs and grass.

PLANT COMPOSITION CANOPY COVER(%)

	MEAN	RANGE	CONST.
SHRUBS			
BARCLAY'S WILLOW *(Salix barclayi)*	3	0-13	34
WILLOW (*Salix spp*)	5	0-33	33
BOG BIRCH (*Betula glandulosa*)	5	0-26	44
FORBS			
LINDLEY'S ASTER *(Aster ciliolatus)*	6	0-15	44
VEINY MEADOW RUE *(Thalictrum venulosum)*	11	0-31	89
YARROW *(Achillea millefolium)*	7	T-13	100
GRACEFUL CINQUEFOIL *(Potentilla gracilis)*	3	T-13	100
STRAWBERRY *(Fragaria virginiana)*	5	0-15	78
AMERICAN VETCH *(Vicia americana)*	2	1-5	100
FIREWEED (*Epilobium angustifolium*)	5	0-10	78
TALL LUNGWORT (*Mertensia paniculata*)	8	0-32	89
GRASSES			
GRACEFUL SEDGE *(Carex praegracilis)*	11	0-21	67
TUFTED HAIRGRASS *(Deschampsia cespitosa)*	11	1-24	100
SLENDER WHEATGRASS *(Agropyron trachycaulum)*	12	0-28	89

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
SUBHYGRIC
NUTRIENT REGIME:
PERMESOTROPHIC
ELEVATION:
1303-1505 M (1385 M)
SOIL DRAINAGE:
MODERATELY WELL
ASPECT:
VARIABLE
SLOPE:
0-5%

FORAGE PRODUCTION(KG/HA)

GRASS: 1612 (864-2416)
FORBS: 894 (477-1702)
TOTAL: 2506 (1478-4118)

ECOLOGICALLY SUSTAINABLE STOCKING RATE
0.3 HA/AUM OR 0.7 ACRES/AUM

UFA5. Rough fescue-Tufted hairgrass

(Festuca scabrella-Deschampsia cespitosa)

n=5 This community type is located up slope from the tufted hairgrass-sedge community type (UFA3) on drier, better drained soils. The drier soil conditions limit the amount of forage being produced. There was 300 kg/ha less forage produced in the rough fescue-tufted hairgrass community type compared to the tufted hairgrass-sedge community type (UFA3).

In the absence of fire and grazing, this community type will become dominated by willow and bog birch (willow/ rough fescue community type (UFB4)). Heavy grazing pressure also decreases the cover of rough fescue and tufted hairgrass and allows Kentucky bluegrass and dandelion to increase (Willoughby, 1992). The dominant plant species on this community are highly palatable and the sites are easily accessible to livestock. Consequently, this community would be rated as primary range.

PLANT COMPOSITION CANOPY COVER(%)

	MEAN	RANGE	CONST.
FORBS			
SLENDER BLUE BEARDTONGUE			
(Penstemon procerus)	4	1-9	100
YARROW			
(Achillea millefolium)	4	1-11	100
GRACEFUL CINQUEFOIL			
(Potentilla gracilis)	3	0-6	80
CHICKWEED			
(Cerastium arvense)	1	0-4	80
MONKSHOOD			
(Aconitum delphinfolium)	1	0-4	40
OLD MAN'S WHISKERS			
(Geum triflorum)	5	0-25	40
GRASSES			
ROUGH FESCUE			
(Festuca scabrella)	23	18-28	100
TUFTED HAIRGRASS			
(Deschampsia cespitosa)	17	3-29	100
SLENDER WHEATGRASS			
(Agropyron trachycaulum)	4	1-6	100
GRACEFUL SEDGE			
(Carex praegracilis)	13	0-50	60
CALIFORNIA OATGRASS			
(Danthonia californica)	3	0-8	60

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
SUBHYGRIC
NUTRIENT REGIME:
PERMESOTROPHIC
ELEVATION:
1370-1737 M (1532 M)
SOIL DRAINAGE:
MODERATELY WELL
ASPECT:
SOUTHEAST
SLOPE:
0-3%

FORAGE PRODUCTION (KG/HA)

GRASS: 1068 (605-1797)
FORBS: 618 (166-1252)
TOTAL: 1684 (913-2272)

ECOLOGICALLY SUSTAINABLE STOCKING RATE
0.5 HA/AUM OR 1.2 ACRES/AUM

UFA6. Rough fescue-Hairy wildrye

(Festuca scabrella-Elymus innovatus)

n=20 These grasslands are located on lower, south facing slopes. They represent the transition zone from the dry junegrass-sedge/ sage (UFA9) dominated south facing slopes to the moist rough fescue and tufted hairgrass dominated community types (UFA5). Grazing pressure causes a shift away from a rough fescue, hairy wildrye dominated community (UFA6) to a sedge, Kentucky bluegrass dominated community (UFC4) (Willoughby, 1992). These grasslands are fairly moist and have well developed soils which makes them very productive. This community type would be rated as primary range.

This community type is very similar to the rough fescue dominated communities described in the Ya Ha Tinda, west of Sundre (Willoughby et al. 2003)

PLANT COMPOSITION CANOPY COVER(%)

	MEAN	RANGE	CONST.
SHRUBS			
BEBB'S WILLOW			
(Salix bebbiana)	3	0-13	25
SHRUBBY CINQUEFOIL			
(*Potentilla fruticosa*)	3	0-13	80
FORBS			
FIREWEED			
(Epilobium angustifolium)	3	0-30	30
OLD MAN'S WHISKERS			
(Geum triflorum)	6	0-20	60
STAR FLOWERED SOLOMON'S SEAL			
(Smilacina stellata)	2	0-27	30
WILD STRAWBERRY			
(Fragaria virginiana)	4	0-9	65
VEINY MEADOW RUE			
(*Thalictrum venulosum*)	3	0-19	75
GRASSES			
ROUGH FESCUE			
(Festuca scabrella)	34	8-85	100
HAIRY WILDRYE			
(Elymus innovatus)	7	0-28	60
SLENDER WHEATGRASS			
(Agropyron trachycaulum)	3	0-18	60
KENTUCKY BLUEGRASS			
(Poa pratensis)	1	0-5	35
GRACEFUL SEDGE			
(*Carex praegracilis*)	4	0-42	20
SEDGE			
(*Carex spp*)	9	0-24	50
PRAIRIE SEDGE			
(Carex prairea)	1	0-18	10
JUNEGRASS			
(*Koeleria macrantha*)	4	0-19	60

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
MESIC
NUTRIENT REGIME:
MESOTROPHIC
ELEVATION:
1320-1800 M (1620 M)
SOIL DRAINAGE:
WELL
ASPECT:
SOUTH
SLOPE:
5-48(17)%

FORAGE PRODUCTION (KG/HA)

GRASS: 2558 (472-5532)
FORBS: 358 (12-976)
TOTAL: 2595 (484-5162)

ECOLOGICALLY SUSTAINABLE STOCKING RATE
0.4 HA/AUM OR 0.9 ACRES/AUM

UFA7. Rough fescue/ Bearberry

(Festuca scabrella/ Arctostaphylos uva-ursi)

n=5 This community type was described in the Upper Clearwater Forest Land Use Zone and is similar to the bog birch/ rough fescue/ bearberry community type but lacks the cover of bog birch. Willoughby (2001) felt that bog birch indicated sites with deeper snow accumulations. This community occupies sites that have shallow, well-drained, and gravelly soils and there maybe little snow cover which does not favour the growth of bog birch. This community is moderately productive but because of the poor soil conditions, precautions must be taken to prevent overutilization.

PLANT COMPOSITION CANOPY COVER(%)

	MEAN	RANGE	CONST.
SHRUBS			
BEARBERRY *(Arctostaphylos uva-ursi)*	23	12-31	100
SHRUBBY CINQUEFOIL (*Potentilla fruticosa*)	2	0-5	80
FORBS			
OLD MAN'S WHISKERS *(Geum triflorum)*	10	0-26	80
YARROW (*Achillea millefolium*)	9	0-38	60
GRACEFUL CINQUEFOIL *(Potentilla gracilis)*	2	0-10	40
GRASSES			
ROUGH FESCUE *(Festuca scabrella)*	41	36-56	100
SLENDER WHEATGRASS *(Agropyron trachycaulum)*	8	1-19	100
GRACEFUL SEDGE *(Carex praegracilis)*	3	0-6	60
FRINGED BROME (*Bromus ciliatus*)	3	0-7	60
HAIRY WILDRYE (*Elymus innovatus*)	3	0-9	60

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
SUBXERIC
NUTRIENT REGIME:
MESOTROPHIC
ELEVATION:
1436-1829 M (1683 M)
SOIL DRAINAGE:
WELL
ASPECT:
SOUTH
SLOPE:
0-5(2)%

FORAGE PRODUCTION (KG/HA)

GRASS: 1023 (580-1686)
FORBS: 538 (204-820)
TOTAL: 1561 (1156-1890)

ECOLOGICALLY SUSTAINABLE STOCKING RATE
0.6 HA/AUM OR 1.3 ACRES/AUM

UFA7a. California oatgrass-Rough fescue/ Bearberry

(*Danthonia californica-Festuca scabrella/ Arctostaphylos uva-ursi*)

n=2 This community type was described in the Ghost area west of Calgary. It appears to represent a transitional grassland between the Montane and Upper Foothills subregions. This community also appears to be transitional between the California oatgrass dominated grasslands (UFA8) and the previously described Rough fescue/Bearberry dominated community. This community is located on steep, south facing slopes and small hillcrests with well-drained subxeric soils. The dry site conditions limit the amount of forage available for domestic livestock and the steep slopes restrict livestock access. Consequently, this community type should be rated non-use.

PLANT COMPOSITION CANOPY COVER(%)

	MEAN	RANGE	CONST.
SHRUBS			
BEARBERRY			
(Arctostaphylos uva-ursi)	21	4-36	100
SHRUBBY CINQUEFOIL			
(*Potentilla fruticosa*)	8	1-15	100
FORBS			
OLD MAN'S WHISKERS			
(Geum triflorum)	20	11-27	100
YARROW			
(*Achillea millefolium*)	2	T-3	100
GRACEFUL CINQUEFOIL			
(Potentilla gracilis)	1	T-1	100
GRASSES			
CALIFORNIA OATGRASS			
(*Danthonia californica*)	29	27-30	100
ROUGH FESCUE			
(Festuca scabrella)	15	7-22	100
IDAHO FESCUE			
(*Festuca idahoensis*)	8	5-11	100
SEDGE			
(Carex spp)	11	4-7	100
HAIRY WILDRYE			
(*Elymus innovatus*)	1	0-2	50

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
SUBXERIC
NUTRIENT REGIME:
MESOTROPHIC
ELEVATION:
1745 M
SOIL DRAINAGE:
WELL
ASPECT:
SOUTH
SLOPE:
25%

FORAGE PRODUCTION (KG/HA)

TOTAL 1561 *ESTIMATE

ECOLOGICALLY SUSTAINABLE STOCKING RATE
0.6 HA/AUM OR 1.3 AC/AUM

UFA8. California oatgrass-Sedge

(Danthonia californica-Carex praegracilis)

n=9 Dry, gravelly or stony soils support this moderately productive grassland that is dominated by California oatgrass. Small pockets of this community type occur throughout the Upper Foothills subregion. In the Yukon, these small meadows were found to form in depressions which appeared to act as pronounced frost pockets (Bailey et al., 1992). In the Subalpine subregion, these California oatgrass dominated grasslands are often associated with bog sedge (Willoughby and Alexander 2003). The cold air drainage and poor nutrient quality of the soil limits the forage productivity of these sites.

PLANT COMPOSITION

	CANOPY COVER(%)		
	MEAN	RANGE	CONST.
SHRUBS			
SHRUBBY CINQUEFOIL (*Potentilla fruticosa*)	7	0-25	60
DWARF BILBERRY *(Vaccinium caespitosum)*	1	0-5	10
FORBS			
LINDLEY'S ASTER *(Aster ciliolatus)*	2	0-10	30
WILD STRAWBERRY *(Fragaria virginiana)*	8	2-15	100
OLD MAN'S WHISKERS *(Geum triflorum)*	14	0-46	90
ALPINE MILK VETCH *(Astragalus alpinus)*	3	0-17	30
VEINY MEADOW RUE *(Thalictrum venulosum)*	7	0-25	90
BLUE EYED GRASS *(Sisyrinchium montanum)*	2	0-19	30
GRASSES			
CALIFORNIA OATGRASS *(Danthonia californica)*	31	0-57	90
GRACEFUL SEDGE *(Carex praegracilis)*	10	0-37	50
SEDGE (*Carex spp*)	18	0-50	50
SLENDER WHEATGRASS *(Agropyron trachycaulum)*	8	0-36	80
SHEEP FESCUE *(Festuca saximontana)*	3	0-15	40
COLUMBIA NEEDLEGRASS *(Stipa columbiana)*	4	0-21	30

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
MESIC
NUTRIENT REGIME:
MESOTROPHIC
ELEVATION:
1400-1580 M (1484 M)
SOIL DRAINAGE:
WELL
ASPECT:
VARIABLE
SLOPE:
0-45%

FORAGE PRODUCTION (KG/HA)

GRASS: 1051 (400-1582)
FORBS: 373 (118-762)
SHRUBS: 585 (110-1402)
TOTAL: 1578 (1033-2014)

ECOLOGICALLY SUSTAINABLE STOCKING RATE
0.6 HA/AUM OR 1.3 ACRES/AUM

UFA9. Junegrass-Sedge/ Sage

(Koeleria macrantha-Carex spp./ Artemisia frigida)

n=4 This community type occurs on steep, south facing slopes with shallow soils overlying sandstone bedrock. The majority of the vegetation is composed of the drought tolerant species: sage, bearberry and junegrass. The inaccessibility and fragile nature of the soils make this community type unsuitable for grazing.

This community type is very similar to the blunt sedge-rocky mtn. fescue/ bearberry community described by Willoughby and Alexander (2003) and the junegrass-hairy wildrye-brome community described by Corns and Achuff (1982) on steep south-facing slopes in the Subalpine subregion.

PLANT COMPOSITION CANOPY COVER(%)

	MEAN	RANGE	CONST.
SHRUBS			
PRICKLY ROSE			
(Rosa acicularis)	2	0-3	75
BEARBERRY			
(Arctostaphylos uva-ursi)	1	0-5	25
FORBS			
PLAINS WORMWOOD			
(Artemisia campestris)	1	0-5	25
FRINGED SAGE			
(Artemisia frigida)	7	0-17	75
MOUNTAIN GOLDENROD			
(Solidago spathulata)	1	0-5	25
LATE YELLOW LOCOWEED			
(Oxytropis monticola)	1	0-3	25
GRASSES			
JUNEGRASS			
(Koeleria macrantha)	19	13-30	100
THREAD-LEAVED SEDGE			
(*Carex filifolia*)	14	0-32	50
SEDGE			
(*Carex spp*)	14	0-38	75
SHEEP FESCUE			
(Festuca saximontana)	1	0-5	25

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
SUB XERIC
NUTRIENT REGIME:
SUBMESOTROPHIC
ELEVATION:
1560-1720 M (1592 M)
SOIL DRAINAGE:
RAPIDLY
ASPECT:
SOUTH
SLOPE:
25-40%

FORAGE PRODUCTION (KG/HA)

GRASS:	737 (400-1044)
FORBS:	359 (222-495)
SHRUBS:	171 (1-400)
TOTAL:	1147 (800-1378)

ECOLOGICALLY SUSTAINABLE STOCKING RATE
NON-USE

UFA10. Bearberry/ Slender wheatgrass

(Arctostaphylos uva-ursi/ Agropyron trachycaulum)

n=2 This community type is found scattered throughout the Upper Foothills subregion on dry, gravelly, well drained river flats. The presence of silverberry, yellow mountain avens, bearberry and early yellow locoweed are very common on these sites.

The poor soil conditions limit the forage productivity and amount of regrowth after grazing. This community type should be rated as secondary or non-use range.

PLANT COMPOSITION

	CANOPY COVER(%)		
	MEAN	RANGE	CONST.
SHRUBS			
SILVERBERRY *(Elaeagnus commutata)*	1	0-1	50
YELLOW MOUNTAIN AVENS *(Dryas drummondii)*	2	0-3	50
BEARBERRY *(Arctostaphylos uva-ursi)*	11	8-12	100
FORBS			
STRAWBERRY *(Fragaria virginiana)*	22	14-29	100
EARLY YELLOW LOCOWEED *(Oxytropis sericea)*	12	0-24	50
YARROW *(Achillea millefolium)*	3	1-5	100
GRASSES			
JUNEGRASS *(Koeleria macrantha)*	3	0-5	50
ROUGH FESCUE *(Festuca scabrella)*	4	0-8	50
SLENDER WHEATGRASS *(Agropyron trachycaulum)*	6	0-11	100
ALPINE BLUEGRASS *(Poa alpina)*	5	0-10	50
SHEEP FESCUE *(Festuca saximontana)*	2	0-3	50

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
SUBMESIC
NUTRIENT REGIME:
MESOTROPHIC
ELEVATION:
1400-1415 M (1408 M)
SOIL DRAINAGE:
WELL
ASPECT:
SOUTHEAST
SLOPE:
0-3%

FORAGE PRODUCTION (KG/HA)

GRASS:	400
SHRUBS:	400
TOTAL:	500

ECOLOGICALLY SUSTAINABLE STOCKING RATE
NON-USE

UFA11. Fireweed/ Hairy wildrye (Forb meadow)

(Epilobium angustifolium/ Elymus innovatus)

n=3 This community type is found on moist lowland sites adjacent to the lodgepole pine and white spruce dominated forests. It represents the transition from the willow and grass dominated riparian areas to the conifer dominated forests. In the absence of disturbance (fire) it appears that succession of conifers into the grassy meadows shifts the species dominance away from a predominantly graminoid cover to one dominated by forbs such as fireweed, Lindley's aster and palmate leaved coltsfoot. There is also a shift in grass cover away from tufted hairgrass, rough fescue and sedge species to more shade tolerant grass species such as purple oatgrass and hairy wildrye. Periodic burning of this site is required to limit tree and shrub expansion.

This community type is very productive and easily accessible to livestock. It would be rated as primary range.

PLANT COMPOSITION CANOPY COVER(%)

	MEAN	RANGE	CONST.
UNDERSTORY TREES			
WHITE SPRUCE *(Picea glauca)*	3	0-8	67
LODGEPOLE PINE *(Pinus contorta)*	6	0-10	67
SHRUBS			
WILLOW *(Salix spp.)*	16	0-25	67
FORBS			
FIREWEED *(Epilobium angustifolium)*	25	T-47	100
STRAWBERRY *(Fragaria virginiana)*	7	3-13	100
LINDLEY'S ASTER *(Aster ciliolatus)*	16	0-26	67
YARROW *(Achillea millefolium)*	7	3-11	100
GRASSES			
HAIRY WILDRYE *(Elymus innovatus)*	10	T-20	100
PURPLE OATGRASS *(Schizachne purpurascens)*	6	0-15	67
TUFTED HAIRGRASS *(Deschampsia cespitosa)*	3	0-4	67

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
SUBHYGRIC
NUTRIENT REGIME:
PERMESOTROPHIC
ELEVATION:
1310-1454 M (1401 M)
SOIL DRAINAGE:
MODERATELY WELL
ASPECT:
SOUTHEAST
SLOPE:
0-2%

FORAGE PRODUCTION (KG/HA)

GRASS: 200
FORBS: 1154
SHRUBS: 400
TOTAL: 1252 (1182-1354)

ECOLOGICALLY SUSTAINABLE STOCKING RATE
0.7 HA/AUM OR 1.6 AC/AUM

UFA12. Rough fescue-Bog sedge

(Festuca scabrella-Kobresia myosuroides)

n=3 This community is very similar to the bog birch/ rough fescue-bog sedge community type described by Willoughby and Alexander (2003) in the Foothills ecodistrict of the Subalpine subregion. Bog sedge is well adapted to growing on dry alpine slopes and rocky ridges in the mountains. Corns and Achuff (1982), described bog sedge dominated community types on windswept ridges in the alpine subregion of Banff and Jasper National Parks. The sites described in this community type appear to represent the transition from the Upper Foothills to the Subalpine subregion.

PLANT COMPOSITION CANOPY COVER(%)

	MEAN	RANGE	CONST.
SHRUBS			
SHRUBBY CINQUEFOIL *(Potentilla fruticosa)*	1	0-3	67
BEARBERRY *(Arctostaphylos uva-ursi)*	4	0-11	33
FORBS			
CHICKWEED *(Cerastium arvense)*	1	1-2	100
OLD MAN'S WHISKERS *(Geum triflorum)*	16	9-21	100
FALSE DANDELION *(Agoseris glauca)*	2	1-6	100
ALPINE HEDYSARUM *(Hedysarum alpinum)*	2	0-5	66
GRASSES			
HAIRY WILDRYE *(Elymus innovatus)*	7	2-17	67
ROUGH FESCUE *(Festuca scabrella)*	27	5-43	100
BOG SEDGE *(Kobresia myosuroides)*	19	7-37	100
SLENDER WHEATGRASS *(Agropyron trachycaulum)*	12	1-22	100
SEDGE *(Carex spp.)*	10	2-13	100

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
MESIC
NUTRIENT REGIME:
MESOTROPHIC
ELEVATION:
1492-1828 M (1676M)
SOIL DRAINAGE:
WELL
ASPECT:
SOUTHERLY
SLOPE:
0-40%

FORAGE PRODUCTION (KG/HA)

GRASS:	966 (832-1232)
FORBS:	149(98-202)
TOTAL:	1115(932-1434)

ECOLOGICALLY SUSTAINABLE STOCKING RATE
0.8HA/AUM

UFA13. Arctic rough fescue

(Festuca altaica)

n=2 This community was described at higher elevations in Willmore Wilderness Park. Bork (1994), described this community type on alpine and subalpine slopes where climate and soil conditions are still suitable for fescue to dominate in the stand. The community has a subhygric moisture regime and is moderately well drained. Forb species such as globeflower, fleabane, monkshood, and mountain heliotrope are all characteristic of these high elevation meadows.

This community is much wetter than the rough fescue-bog sedge community (UFA12) previously described and is similar to the forb meadows community type described by Willoughby and Alexander (2003) in the Subalpine subregion.

PLANT COMPOSITION CANOPY COVER(%)

	MEAN	RANGE	CONST.
SHRUBS			
DWARF BILBERRY (*Vaccinium caespitosum*)	3	2-3	100
DWARF BIRCH (*Betula glandulosa*)	1	0-1	50
FORBS			
YARROW *(Achillea millefolium)*	2	1-3	100
MONKSHOOD *(Aconitum delphinifolium)*	1	0-2	100
MOUNTAIN HELIOTROPE *(Valeriana sitchensis)*	1	0-2	100
WANDERING DAISY *(Erigeron peregrinus)*	2	0-3	50
GLOBEFLOWER (*Trollius albiflorus*)	2	0-4	50
GRASSES			
ROUGH FESCUE *(Festuca altaica)*	47	36-57	100
MOUNTAIN TIMOTHY *(Phleum commutatum)*	2	2-2	100
SLENDER WHEATGRASS (*Agropyron trachycaulum*)	2	2-2	100
SEDGE (*Carex spp.*)	6	5-7	100
TUFTED HAIRGRASS (*Deschampsia cespitosa*)	2	0-4	50

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
SUBHYGRIC
NUTRIENT REGIME:
PERMESOTROPHIC
ELEVATION:
1510-2000 M (1755 M)
SOIL DRAINAGE:
MODERATELY WELL

FORAGE PRODUCTION (KG/HA)

GRASS: 743 (527-959)
FORBS: 372 (368-375)
TOTAL: 1115 (895-1334)

ECOLOGICALLY SUSTAINABLE STOCKING RATE
0.8 HA/AUM OR 1.7 AC/AUM

UFA14. Cow parsnip-Veiny meadow rue/ Fringed brome

(Heracleum lanatum-Thalictrum venulosum/ Bromus ciliatus)

n=1 This community type is transitional between the Lower Foothills and Upper Foothills subregions. It was described on fine textured, silty soils adjacent to the Baptiste river west of Rocky Mountain House. Grazed stands of this community type were also described in the Solomon valley, west of Hinton. Increased grazing pressure generally allows timothy, Kentucky bluegrass and dandelion to increase with a corresponding drop in the cover of cow parsnip, meadow rue and the native grasses and sedges. The high moisture and nutrient regime of this site makes it extremely productive, and once it has been invaded by agronomic species it is highly palatable for domestic livestock. It is difficult to find representative stands of this community type that have not been grazed.

PLANT COMPOSITION CANOPY COVER(%)

	MEAN	RANGE	CONST.
SHRUBS			
WILLOW (*Salix spp.*)	4	-	100
SNOWBERRY (*Symphoricarpos occidentalis*)	4	-	100
FORBS			
COW PARSNIP *(Heracleum lanatum)*	21	-	100
VEINY MEADOW RUE *(Thalictrum venulosum)*	10	-	100
TALL LUNGWORT *(Mertensia paniculata)*	11	-	100
TALL LARKSPUR *(Delphinium glaucum)*	8	-	100
FIREWEED *(Epilobium angustifolium)*	5	-	100
AMERICAN VETCH (*Vicia americana*)	3	-	100
GRASSES			
KENTUCKY BLUEGRASS *(Poa pratensis)*	15	-	100
AWNED SEDGE *(Carex atherodes)*	7	-	100
SLENDER WHEATGRASS (*Agropyron trachycaulum*)	4	-	100
SEDGE (*Carex spp.*)	12	-	100
FRINGED BROME (*Bromus ciliatus*)	6	-	100

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
SUBHYGRIC
NUTRIENT REGIME:
PERMESOTROPHIC
ELEVATION:
1060 M
SOIL DRAINAGE:
MODERATELY WELL

FORAGE PRODUCTION (KG/HA)

TOTAL: 5000

ECOLOGICALLY SUSTAINABLE STOCKING RATE
0.3 HA/AUM OR 0.4 AC/AUM

UFA15. Hairy wildrye-Sedge

(Elymus innovatus-Carex spp.)

n=1 This community type was described on south facing slopes along Wilson Creek in the Upper Foothills subregion. Corns and Achuff (1982) described similar community types in the subalpine of Banff and Jasper National Parks. These included the shrubby cinquefoil/ hairy wildrye and hairy wildrye/ bearberry-juniper community types. Both of these community types were associated with steep south facing slopes. The presence of this community type may indicate the transition to the Subalpine subregion.

This community type does not produce a large amount of forage because of the dry site conditions and poor nutrient content of the soil, but the lack of open areas for livestock grazing in this subregion makes these grassland sites attractive to livestock.

PLANT COMPOSITION CANOPY COVER(%)

	MEAN	RANGE	CONST.
FORBS			
SHOWY LOCOWEED *(Oxytropis splendens)*	18	-	100
AMERICAN VETCH *(Vicia americana)*	8	-	100
LOW GOLDENROD *(Solidago multiradiata)*	6	-	100
STRAWBERRY *(Fragaria virginiana)*	2	-	100
FIREWEED *(Epilobium angustifolium)*	4	-	100
ALPINE HEDYSARUM (*Hedysarum alpinum*)	1	-	100
GRASSES			
HAIRY WILDRYE *(Elymus innovatus)*	50	-	100
ARCTIC BLUEGRASS *(Poa arctica)*	6	-	100
SEDGE (*Carex spp.*)	5	-	100

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
SUBMESIC
NUTRIENT REGIME:
SUBMESOTROPHIC
ELEVATION:
1860 M
SOIL DRAINAGE:
WELL
ASPECT:
SOUTHWEST
SLOPE:
5%

FORAGE PRODUCTION(KG/HA)

GRASS:	222
FORBS:	66
SHRUBS:	8
TOTAL:	296

ECOLOGICALLY SUSTAINABLE STOCKING RATE
3.1 HA/AUM OR 6.9 AC/AUM

UFA16. Hairy wildrye-Rough fescue/ Bearberry

(Elymus innovatus-Festuca scabrella/ Arctostaphylos uva-ursi)

n=1 This community was described in the Ghost area west of Calgary on a well drained, level valley floor. It appears to represent a grazed rough fescue, bearberry or hairy wildrye dominated community. Willoughby (2000) found that heavy grazing on the rough fescue dominated grasslands often leads to a community that is dominated by sedge and hairy wildrye. Protection from grazing or a reduction in stocking rate allows this community type to recover back to a rough fescue dominated community. The time frame for complete recovery takes 20 years (Willoughby 2000)

PLANT COMPOSITION CANOPY COVER(%)

	MEAN	RANGE	CONST.
SHRUBS			
BEARBERRY *(Arctostaphylos uva-ursi)*	7	-	100
SHRUBBY CINQUEFOIL *(Potentilla fruticosa)*	1	-	100
FORBS			
FIREWEED *(Epilobium angustifolium)*	5	-	100
GRACEFUL CINQUEFOIL *(Potentilla gracilis)*	4	-	100
GOLDENROD *(Solidago missouriensis)*	1	-	100
SMOOTH ASTER *(Aster laevis)*	1	-	100
STRAWBERRY *(Fragaria virginiana)*	13	-	100
VEINY MEADOW RUE *(Thalictrum venulosum)*	1	-	100
GRASSES			
SLENDER WHEATGRASS *(Agropyron trachycaulum)*	2	-	100
HAIRY WILDRYE *(Elymus innovatus)*	11	-	100
SEDGE *(Carex spp.)*	1	-	100
ROUGH FESCUE *(Festuca scabrella)*	2	-	100

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
MESIC
NUTRIENT REGIME:
MESOTROPHIC
ELEVATION:
1680
SOIL DRAINAGE:
MODERATELY WELL
ASPECT:
EAST
SLOPE:
3%

FORAGE PRODUCTION(KG/HA)

GRASS: 2008
FORBS: 557
TOTAL: 2121

ECOLOGICALLY SUSTAINABLE STOCKING RATE
0.4 HA/AUM OR 1.0 AC/AUM

UFA17. Idaho fescue-Parry oatgrass-Sedge

(Festuca idahoensis-Danthonia parryi-Carex spp.)

n=2 This community type was described in the Ghost area west of Calgary. This area represents a transition between the Montane and Upper Foothills subregions. This community type is very similar to moderately and heavily grazed rough fescue dominated communities in the Montane subregion. Both Idaho fescue and Parry oatgrass are more characteristic of the Montane subregion and increase with increased grazing pressure. Protection from grazing will often allow this community type to recover back to a Rough fescue-Parry oatgrass dominated community type.

PLANT COMPOSITION CANOPY COVER(%)

	MEAN	RANGE	CONST.
SHRUBS			
SHRUBBY CINQUEFOIL (*Potentilla fruticosa*)	3	2-3	100
BOG BIRCH (*Betula glandulosa*)	3	0-5	50
WILLOW (*Salix spp*)	2	0-4	50
FORBS			
STRAWBERRY *(Fragaria virginiana)*	22	10-33	100
YARROW (*Achillea millefolium*)	13	6-18	100
VEINY MEADOW RUE (*Thalictrum venulosum*)	10	7-11	100
GRACEFUL CINQUEFOIL (*Potentilla gracilis*)	4	0-8	50
GRASSES			
SEDGE (*Carex spp.*)	39	28-50	100
IDAHO FESCUE (*Festuca idahoensis*)	22	28-50	100
PARRY'S OATGRASS (*Danthonia parryi*)	21	16-25	100
HAIRY WILDRYE *(Elymus innovatus)*	2	0-3	50

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
SUBHYGRIC
NUTRIENT REGIME:
MESOTROPHIC
ELEVATION:
1400 M
SOIL DRAINAGE:
IMPERFECTLY
ASPECT:
SOUTH
SLOPE:
2-15%

FORAGE PRODUCTION(KG/HA)

TOTAL: 1467 *ESTIMATE

ECOLOGICALLY SUSTAINABLE STOCKING RATE
0.6 HA/AUM OR 1.4 AC/AUM

UFB1. Willow-Bog birch/ Water sedge

(Salix spp.-Betula glandulosa/ Carex aquatilis)

n=45 This shrub community appears in areas with very poor drainage. It is found in association with the wetter water sedge meadows (UFA1). These sites are fairly productive but are difficult to graze due to the moist ground conditions and heavy shrub cover which reduces access and mobility in the area. Increased flooding and prolonged water logging may result in the disappearance of willow and a transition to a water sedge meadow.

PLANT COMPOSITION

	CANOPY COVER(%)		
	MEAN	**RANGE**	**CONST.**
SHRUBS			
BARCLAY'S WILLOW (*Salix barclayi*)	2	0-48	9
WILLOW *(Salix spp.)*	28	0-65	84
BOG BIRCH *(Betula glandulosa)*	11	0-58	56
FORBS			
ARROW LEAVED COLTSFOOT *(Petasites sagittatus)*	1	0-13	36
LINDLEY'S ASTER *(Aster ciliolatus)*	1	0-6	11
STICKY PURPLE GERANIUM *(Geranium viscosissimum)*	1	0-14	11
GRACEFUL CINQUEFOIL *(Potentilla gracilis)*	1	0-7	29
ARCTIC ASTER *(Aster sibiricus)*	1	0-8	2
GRASSES			
WATER SEDGE *(Carex aquatilis)*	11	0-76	24
SEDGE (*Carex spp.*)	40	0-82	71
TUFTED HAIRGRASS *(Deschampsia cespitosa)*	6	0-35	80
MARSH REEDGRASS *(Calamagrostis canadensis)*	1	0-13	11

ENVIRONMENTAL VARIABLES

MOISTURE REGIME :
SUBHYDRIC
NUTRIENT REGIME
MESOTROPHIC
ELEVATION:
1227-1820 M (1443 M)
SOIL DRAINAGE:
POORLY
ASPECT:
VARIABLE
SLOPE:
0-14%

FORAGE PRODUCTION (KG/HA)

GRASS: 1325 (340-3000)
FORBS: 126 (2-402)
SHRUBS: 732 (54-2180)
TOTAL: 2105 (814-4662)

ECOLOGICALLY SUSTAINABLE STOCKING RATE
NON-USE

UFB2. Willow/ Slender wheatgrass-Sedge

(Salix spp./ Agropyron trachycaulum-Carex spp.)

n=4 This community type is very similar to the tufted hairgrass-sedge-slender wheatgrass c.t. (UFA4) previously described. Both community types appear to represent the various stages of succession onto tufted hairgrass meadows. When these communities are protected from disturbance (fire and grazing), willow and bog birch expand and tufted hairgrass declines. Willow growth also appears to favour the growth of tall forbs (veiny meadow rue, fireweed, aster) and slender wheatgrass. Fire has played a dominant role in controlling brush encroachment in the past and continued protection will allow continued shrub expansion, resulting in a decline in forage production.

PLANT COMPOSITION	CANOPY COVER(%)		
	MEAN	RANGE	CONST.
SHRUBS			
BARCLAY'S WILLOW			
(Salix barclayi)	13	0-19	75
BOG BIRCH			
(*Betula glandulosa*)	13	2-23	100
FORBS			
VEINY MEADOW RUE			
(Thalictrum venulosum)	7	3-9	100
OLD MAN'S WHISKERS			
(Geum triflorum)	17	3-23	100
STRAWBERRY			
(Fragaria virginiana)	13	10-15	100
TALL LARKSPUR			
(Delphinium glaucum)	1	0-T	50
LINDLEY'S ASTER			
(Aster ciliolatus)	10	0-26	75
YARROW			
(Achillea millefolium)	8	4-13	100
GRASSES			
GRACEFUL SEDGE			
(Carex praegracilis)	24	0-37	75
SEDGE			
(*Carex spp.*)	7	0-29	25
SLENDER WHEATGRASS			
(Agropyron trachycaulum)	15	0-22	75
CALIFORNIA OATGRASS			
(Danthonia californica)	7	0-20	100
TUFTED HAIRGRASS			
(Deschampsia cespitosa)	4	0-12	75

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
SUBHYGRIC
NUTRIENT REGIME :
PERMESOTROPHIC
ELEVATION:
1349-1615 M (1455 M)
SOIL DRAINAGE:
WELL
ASPECT:
NORTH TO NORTHEAST
SLOPE:
0-4%

FORAGE PRODUCTION (KG/HA)

GRASS: 1573
FORBS: 735
TOTAL: 1669 (900-2308)

ECOLOGICALLY SUSTAINABLE STOCKING RATE
0.5 HA/AUM OR 1.2 ACRES/AUM

UFB3. Willow-Bog birch/ Tufted hairgrass

(Salix spp.-Betula glandulosa/ Deschampsia cespitosa)

n=19 This community type is found in association with the tufted hairgrass-sedge c.t. (UFA3). Willow encroachment into a tufted hairgrass meadow eventually results in this community type. Historically, fire has played an important role in the maintenance of the grassland community types in this subregion. Continued fire suppression will eventually allow willow and bog birch to invade many of these grassy meadows.

The encroachment of willow onto the tufted hairgrass-sedge c.t. causes a decline in forage production from 2200 kg/ha to 1200 kg/ha for grass and forb production. Continued protection of this community type from disturbance will most likely lead to the development of a community type similar to the willow/ slender wheatgrass (UFB2) and then to the pussy willow shrubland (UFB7). The latter community has a high cover of willow (71%) and very little forage for domestic livestock.

PLANT COMPOSITION CANOPY COVER(%)

	MEAN	RANGE	CONST.
SHRUBS			
BARCLAY'S WILLOW *(Salix barcalyi)*	28	0-85	74
BOG BIRCH *(Betula glandulosa)*	15	0-77	84
FORBS			
YARROW *(Achillea millefolium)*	5	2-14	100
WILD STRAWBERRY *(Fragaria virginiana)*	7	0-30	90
LINDLEY'S ASTER *(Aster ciliolatus)*	9	0-25	84
VEINY MEADOW RUE *(Thalictrum venulosum)*	5	0-21	84
GRACEFUL CINQUEFOIL *(Potentilla gracilis)*	3	0-10	89
DANDELION *(Taraxacum offincinale)*	2	0-11	53
GRASSES			
TUFTED HAIRGRASS *(Deschampsia cespitosa)*	19	1-38	100
SLENDER WHEATGRASS *(Agropyron trachycaulum)*	8	0-25	94
GRACEFUL SEDGE *(Carex praegracilis)*	10	0-31	58
PURPLE OATGRASS *(Schizachne purpurascens)*	3	0-32	47

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
SUBHYGRIC
NUTRIENT REGIME:
PERMESOTROPHIC
ELEVATION:
1104-1667 M (1420 M)
SOIL DRAINAGE:
MODERATELY WELL
ASPECT:
VARIABLE
SLOPE:
0-10%

FORAGE PRODUCTION(KG/HA)

GRASS: 724 (275-2307)
FORBS: 523 (8-1052)
SHRUBS: 408 (0-727)
TOTAL: 1700 (500-3200)

ECOLOGICALLY SUSTAINABLE STOCKING RATE
0.5 HA/AUM OR 1.1 ACRES/AUM

UFB4. Willow-Bog birch/ Rough fescue

(Salix spp.-Betula glandulosa/ Festuca scabrella)

n=3 This community type was described by Bork (1994) in Willmore Wilderness Park. Bork felt this community type originated from recent shrub encroachment onto rough fescue grasslands. Continued shrub expansion will result in decreasing forage productivity. Bork also felt that fescue will be replaced by wheatgrass and sedge plant species. These plants being better adapted to shading and competition from adjacent shrubs.

PLANT COMPOSITION

	CANOPY COVER(%)		
	MEAN	RANGE	CONST.
SHRUBS			
WILLOW			
(SALIX SPP)	18	1-27	100
BOG BIRCH			
(Betula glandulosa)	24	10-38	100
YELLOW MOUNTAIN AVENS			
(Dryas drummondii)	3	0-5	33
ALPINE BEARBERRY			
(Arctostaphylos rubra)	2	0-7	33
FORBS			
ALPINE BISTORT			
(Polygonum viviparum)	7	T-19	100
MONKSHOOD			
(Aconitium delphinifolium)	2	0-5	33
STRAWBERRY			
(Fragaria virginiana)	9	2-20	100
GRASSES			
ROUGH FESCUE			
(Festuca scabrella)	16	12-20	100
GRACEFUL SEDGE			
(Carex praegracilis)	18	3-32	100
TUFTED HAIRGRASS			
(*Deschampsia cespitosa*)	9	1-20	100
CALIFORNIA OATGRASS			
(*Danthonia californica*)	6	2-10	100

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
SUBHYGRIC
NUTRIENT REGIME:
PERMESOTROPHIC
ELEVATION:
1530-1560 M (1550 M)
SOIL DRAINAGE:
MODERATELY WELL
ASPECT:
WESTERLY
SLOPE:
0-4%

FORAGE PRODUCTION(KG/HA)

GRASS: 600
FORBS: 200
SHRUBS: 150
TOTAL: 950

ECOLOGICALLY SUSTAINABLE STOCKING RATE
1.0 HA/AUM OR 2.2 ACRES/AUM

UFB5. Bog birch/ Rough fescue/ Bearberry

(Betula glandulosa/ Festuca scabrella/ Arctostaphylos uva-ursi)

n=25 This community type is very similar to the rough fescue-bearberry (UFA7) type previously described, but it is successionally more advanced. The soils on this community type are gravelly, drier and have a poorer nutrient regime than the other rough fescue and tufted hairgrass dominated community types. The lack of fire on this community type has allowed the shrub cover to expand, reducing forage productivity for wildlife and domestic livestock. In one study, burning a bog birch/ rough fescue/ bearberry community type twice in 3 year intervals controlled birch growth and increased total forage production by over 40% compared to the unburned control (Bork, 1990).

PLANT COMPOSITION

	CANOPY COVER(%)		
	MEAN	RANGE	CONST.
SHRUBS			
BOG BIRCH *(Betula glandulosa)*	32	1-60	100
WILLOW (*Salix spp*)	2	0-13	42
BEARBERRY *(Arctostaphylos uva-ursi)*	9	0-28	80
FORBS			
LINDLEY'S ASTER *(Aster ciliolatus)*	1	0-4	25
ALPINE MILKVETCH *(Astragalus alpinus)*	1	0-9	25
WILD STRAWBERRY *(Fragaria virginiana)*	6	0-24	83
FIREWEED *(Epilobium angustifolium)*	3	0-6	67
SLENDER BLUE BEARDTONGUE *(Penstemon procerus)*	1	0-8	45
OLD MAN'S WHISKERS (*Geum triflorum*)	3	0-17	79
GRASSES			
ROUGH FESCUE *(Festuca scabrella)*	24	3-81	100
GRACEFUL SEDGE *(Carex praegracilis)*	5	0-19	96
SLENDER WHEATGRASS *(Agropyron trachycaulum)*	3	0-20	33
CALIFORNIA OATGRASS (*Danthonia californica*)	8	0-44	75

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
SUBHYGRIC
NUTRIENT REGIME:
PERMESOTROPHIC
ELEVATION:
1303-1798 M (1539 M)
SOIL DRAINAGE:
WELL
ASPECT:
SOUTHERLY
SLOPE:
1-25%

FORAGE PRODUCTION(KG/HA)

GRASS:	1173(856-1452)
FORBS:	212(76-394)
SHRUBS:	369(156-582))
TOTAL:	1569 (1000-1686)

ECOLOGICALLY SUSTAINABLE STOCKING RATE
0.6 HA/AUM OR 1.3 ACRES/AUM

UFB6. Willow-Bog birch/ California oatgrass-Sedge

(Salix spp.-Betula glandulosa/ Danthonia californica-Carex spp.)

n=8 This community type likely develops from willow encroachment onto an oatgrass dominated meadow. The oatgrass meadows are found on dry, gravelly soils. These meadows may also form in frost pockets. The spread of willow is likely caused by the lack of natural disturbance, such as fire. The cover of willow on this community type is fairly extensive. This will restrict access of domestic livestock. This community type would be rated as secondary range.

PLANT COMPOSITION CANOPY COVER(%)

	MEAN	RANGE	CONST.
SHRUBS			
WILLOW			
(Salix spp.)	13	0-60	71
BOG BIRCH			
(Betula glandulosa)	14	0-30	87
FORBS			
BEARBERRY			
(Arctostaphylos uva-ursi)	8	0-44	55
YARROW			
(Achillea millefolium)	6	2-24	100
GRACEFUL CINQUEFOIL			
(Potentilla gracilis)	4	0-15	75
WILD STRAWBERRY			
(Fragaria virginiana)	12	1-44	100
SLENDER BLUE BEARDTONGUE			
(Penstemon procerus)	2	0-6	63
ALSIKE CLOVER			
(Trifolium pratense)	2	0-17	25
FIREWEED			
(Epilobium angustifolium)	1	0-4	63
VEINY MEADOW RUE			
(Thalictrum venulosum)	3	0-9	88
GRASSES			
CALIFORNIA OATGRASS			
(Danthonia californica)	24	17-56	100
GRACEFUL SEDGE			
(Carex praegracilis)	15	3-30	100
SHEEP FESCUE			
(Festuca saximontana)	10	0-22	75
SLENDER WHEATGRASS			
(Agropyron trachycaulum)	3	0-10	50

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
SUBHYGRIC
NUTRIENT REGIME:
PERMESOTROPHIC
ELEVATION:
1400-1530 M (1478 M)
SOIL DRAINAGE:
MODERATELY WELL
ASPECT:
WEST
SLOPE:
0-30%

FORAGE PRODUCTION(KG/HA)

GRASS:	598
FORBS:	418
SHRUBS:	300
TOTAL:	1316

ECOLOGICALLY SUSTAINABLE STOCKING RATE
0.7 HA/AUM OR 1.5 ACRES/AUM

UFB7. Pussy willow shrubland

(Salix discolor)

n=2 This community type is common along riparian areas, swamps and fringes of marshes and lakes. It appears to be successionally more advanced than the other willow dominated community types described in this guide. As the willow cover expands over time it shades the understory vegetation resulting in a loss of forage productivity. This community type produces only 200 kg/ha and is generally inaccessible to domestic livestock. This community type should be rated as non-use.

PLANT COMPOSITION

	CANOPY COVER(%)		
	MEAN	RANGE	CONST.
SHRUBS			
PUSSY WILLOW *(Salix discolor)*	71	70-71	100
BOG BIRCH *(Betula glandulosa)*	20	8-30	100
FORBS			
LINDLEY'S ASTER *(Aster ciliolatus)*	6	5-7	100
PALMATE LEAVED COLTSFOOT *(Petasites palmatus)*	3	0-0	100
WILD STRAWBERRY *(Fragaria virginiana)*	4	1-7	100
GRASSES			
TUFTED HAIRGRASS *(Deschampsia cespitosa)*	5	1-9	100
MARSH REEDGRASS *(Calamagrostis canadensis)*	3	0-5	100

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
SUBHYGRIC
NUTRIENT REGIME:
PERMESOTROPHIC
ELEVATION:
1318-1325 M (1322 M)
SOIL DRAINAGE:
MODERATELY WELL

FORAGE PRODUCTION(KG/HA)

TOTAL: 181 (101-261)

ECOLOGICALLY SUSTAINABLE STOCKING RATE
NON-USE

UFB8. Willow-Bog birch/ Hairy wildrye-Sedge

(Salix spp.-Betula glandulosa/ Elymus innovatus-Carex spp.)

n=4 This plant community represents a rough fescue-hairy wildrye community type (UFA6) that has continued to undergo succession in the absence of fire and grazing. Willow cover has increased, shading the growth of grasses (rough fescue) and allowing tall-growing forbs (fireweed, aster, veiny meadow rue) to increase. Continued protection from disturbance will allow succession to shrub and eventually tree species. The understorey vegetation will be increasingly shaded and forage production will continue to decrease.

PLANT COMPOSITION CANOPY COVER(%)

	MEAN	RANGE	CONST.
TREES			
WHITE SPRUCE *(Picea glauca)*	1	0-T	50
SHRUBS			
WILLOW SPP. *(Salix barclayi)*	30	19-40	100
BOG BIRCH *(Betula glandulosa)*	21	5-36	100
FORBS			
LINDLEY'S ASTER *(Aster ciliolatus)*	12	10-13	100
VEINY MEADOW RUE *(Thalictrum venulosum)*	6	2-8	100
FIREWEED *(Epilobium angustifolium)*	5	2-7	100
STRAWBERRY *(Fragaria virginiana)*	11	8-13	100
TALL LUNGWORT *(Mertensia paniculata)*	4	0-6	100
GRASSES			
GRACEFUL SEDGE *(Carex praegracilis)*	32	20-44	100
HAIRY WILDRYE *(Elymus innovatus)*	25	13-37	100
PURPLE OATGRASS *(Schizachne purpurascens)*	22	9-35	100
SLENDER WHEATGRASS *(Agropyron trachycaulum)*	22	16-26	100

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
SUBHYGRIC
NUTRIENT REGIME:
PERMESOTROPHIC
ELEVATION:
1371-1500 M (1442) M
SOIL DRAINAGE:
MODERATELY WELL
ASPECT:
NORTHEAST
SLOPE:
0-3%

FORAGE PRODUCTION(KG/HA)

TOTAL: 1550 (900-2200)

ECOLOGICALLY SUSTAINABLE STOCKING RATE
0.5 HA/AUM OR 1.1 ACRES/AUM

UFB9. Bog birch/ Sedge-Marsh reedgrass

(Betula glandulosa/ Carex spp.-Calamagrostis canadensis)

n=1 This community type occupies valley drainages on soils that are saturated with water for part of the growing season. This type is very similar to the willow-bog birch/ sedge (UFB1) c.t, but lacks the willow cover. It is not clear why there is no willow cover on this type. It is possible that bog birch is better adapted to growing on poor nutrient soils. The presence of marsh reedgrass may indicate the transition from the Lower Foothills to Upper Foothills subregion. Willoughby (1992), observed that marsh reedgrass was more abundant on these lowland sites at lower elevations.

The thick cover of bog birch and very wet conditions restrict access to domestic livestock. Consequently, this community type would be rated as secondary or non-use range.

PLANT COMPOSITION

	CANOPY COVER(%)		
	MEAN	RANGE	CONST.
SHRUBS			
BOG BIRCH *(Betula glandulosa)*	39	-	100
FORBS			
DWARF RASPBERRY *(Rubus arcticus)*	1	-	100
GRASSES			
MARSH REEDGRASS *(Calamagrostis canadensis)*	11	-	100
TUFTED HAIRGRASS *(Deschampsia cespitosa)*	2	-	100
BROWNISH SEDGE *(Carex brunnescens)*	11	-	100

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
HYGRIC
NUTRIENT REGIME:
SUBMESOTROPHIC
ELEVATION:
1513 M
SOIL DRAINAGE:
IMPERFECTLY
ASPECT:
WEST
SLOPE:
3%

FORAGE PRODUCTION(KG/HA)

GRASS:	796
FORBS:	58
SHRUBS:	322
TOTAL:	1176

ECOLOGICALLY SUSTAINABLE STOCKING RATE
NON-USE

UFB10. Willow-Bog birch/ Sedge

(Salix spp.-Betula glandulosa/ Carex spp.)

n=32 This type is very similar to the willow-bog birch/ water sedge community type (UFB1), but the soils are drier and better drained. The drier soil conditions favour the growth of graceful sedge over water sedge.

This community type has a thick cover of bog birch and willow which restricts livestock access to the forage. This community type would be rated as secondary or non-use range.

PLANT COMPOSITION

	CANOPY COVER(%)		
	MEAN	RANGE	CONST.
SHRUBS			
BOG BIRCH *(Betula glandulosa)*	30	8-55	100
WILLOW *(Salix spp)*	21	2-46	100
FORBS			
LINDLEY'S ASTER *(Aster ciliolatus)*	5	0-15	81
YARROW *(Achillea millefolium)*	2	0-11	97
STRAWBERRY *(Fragaria virginiana)*	3	0-14	75
TALL LUNGWORT *(Mertensia paniculata)*	3	0-6	53
VEINY MEADOW RUE *(Thalictrum venulosum)*	3	0-8	72
GRASSES			
GRACEFUL SEDGE *(Carex praegracilis)*	22	0-53	95
SLENDER WHEATGRASS *(Agropyron trachycaulum)*	3	0-27	72
HAIRY WILDRYE *(Elymus innovatus)*	2	0-25	38
TUFTED HAIRGRASS *(Deschampsia cespitosa)*	4	0-10	78

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
HYGRIC-SUBHYGRIC
NUTRIENT REGIME:
MESOTROPHIC
ELEVATION:
1356-1646 M (1500 M)
SOIL DRAINAGE:
MOD. WELL
ASPECT:
VARIABLE
SLOPE:
0-10%

FORAGE PRODUCTION(KG/HA)

GRASS: 543(0-600)
FORBS: 395(0-1000)
SHRUB: 125(200-1016)
TOTAL: 1181(572-2200)

ECOLOGICALLY SUSTAINABLE STOCKING RATE
0.8 HA/AUM OR 2.0 AC/AUM

UFB11. Willow-Bog birch

(Salix barclayi-Betula glandulosa)

n=11 This community type is very similar to the willow-bog birch/ sedge c.t. (UFB1), but is successionally more advanced. The lack of fire has allowed continued expansion of the shrub cover. This has restricted access to livestock and lowered forage productivity. This community type would be rated as non-use for domestic livestock.

PLANT COMPOSITION CANOPY COVER(%)

	MEAN	RANGE	CONST.
SHRUBS			
WILLOW SPP *(Salix spp)*	37	0-85	100
BOG BIRCH *(Betula glandulosa)*	17	5-50	100
FORBS			
VEINY MEADOW RUE *(Thalictrum venulosum)*	2	0-9	73
STRAWBERRY *(Fragaria virginiana)*	5	0-14	73
FIREWEED *(Epilobium angustifolium)*	2	0-7	73
LINDLEY'S ASTER *(Aster ciliolatus)*	4	0-16	55
GRASSES			
BALTIC RUSH *(Juncus balticus)*	2	0-10	90
GRACEFUL SEDGE *(Carex praegracilis)*	2	0-5	54
SLENDER WHEATGRASS *(Agropyron trachycaulum)*	2	0-5	55
TUFTED HAIRGRASS *(Deschampsia cespitosa)*	2	0-6	64

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
SUBHYGRIC
NUTRIENT REGIME:
MESOTROPHIC
ELEVATION:
1375-1646 M (1472 M)
SOIL DRAINAGE:
IMPERFECTLY
ASPECT:
VARIABLE
SLOPE:
0-5%

FORAGE PRODUCTION(KG/HA)

GRASS: 1265 (383 -2966)
FORBS: 811 (200-1188)
SHRUBS: 438 (200-752)
TOTAL: 2105 (783-4292)

ECOLOGICALLY SUSTAINABLE STOCKING RATE
NON-USE

UFB12. Willow-Alder/ Horsetail

(Salix bebbiana-Alnus tenuifolia/ Equisetum arvense)

n=1 This community type was described on the boundary between the Upper and Lower foothills subregions in the Solomon valley northwest of Hinton. It is very similar to the to the willow-alder/ shield fern-wild sarsaparilla community described by Lane et al (2000) in the Saddle Hills north of Grande Prairie. This community tends to occupy moist nutrient rich seepage areas which favour the growth of willow, horsetail and fern species. The high cover of willow and alder limits productivity of forbs and grass. It also limits access to domestic livestock. As a result this community type would be rated as non-use.

PLANT COMPOSITION

PLANT COMPOSITION	CANOPY COVER(%)		
	MEAN	RANGE	CONST.
SHRUBS			
BEBB'S WILLOW *(Salix bebbiana)*	85	-	100
RIVER ALDER *(Alnus tenuifolia)*	15	-	100
BRACTED HONEYSUCKLE *(Lonicera involcrata)*	5	-	100
FORBS			
HORSETAIL *(Equisetum arvense)*	14	-	100
STRAWBERRY *(Fragaria virginiana)*	1	-	100
TALL LUNGWORT *(Mertensia paniculata)*	3	-	100
LINDLEY'S ASTER *(Aster ciliolatus)*	1	-	100
COW PARSNIP *(Heracleum lanatum)*	2	-	100
GRASSES			
TALL MANNA GRASS *(Glyceria grandis)*	1	-	100
KENTUCKY BLUEGRASS *(Poa pratensis)*	1	-	100

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
HYGRIC
NUTRIENT REGIME:
PERMESOTROPHIC
ELEVATION:
1200 M
SOIL DRAINAGE :
IMPERFECTLY

FORAGE PRODUCTION(KG/HA)

GRASS: 162
FORBS: 1786
TOTAL: 1948

ECOLOGICALLY SUSTAINABLE STOCKING RATE
NON-USE

UFB13. Willow/Sedge-Cottongrass

(Salix spp./Carex spp.-Eriophorum spp.)

n=1 This community type was described on the boundary between the Upper and Lower foothills subregions in Williams Creek west of Sundre. This community tends to occupy acidic boggy areas which favours the growth of cottongrass species. The higher acidity limits productivity of forbs and grass and the higher moisture regime limits access to domestic livestock. As a result this community type would be rated as non-use.

PLANT COMPOSITION CANOPY COVER(%)

	MEAN	RANGE	CONST.
SHRUBS			
WILLOW *(Salix spp)*	11	-	100
BOG BIRCH *(Betula glandulosa)*	6	-	100
FORBS			
HORSETAIL *(Equisetum hyemale)*	4	-	100
ELEPHANT'S HEAD *(Pedicularis spp.)*	1	-	100
GRASSES			
COTTONGRASS *(Eriophorum spp.)*	25	-	100
SEDGE *(Carex spp.)*	1	-	100
TUFTED HAIRGRASS *(Deschampsia cespitosa)*	2	-	100

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
HYGRIC
NUTRIENT REGIME:
SUBMESOTROPHIC
ELEVATION:
1200 M
SOIL DRAINAGE :
IMPERFECTLY

FORAGE PRODUCTION(KG/HA)

TOTAL: 1148

ECOLOGICALLY SUSTAINABLE STOCKING RATE
NON-USE

UPPER FOOTHILLS SUBREGION

SHRUBLANDS AND GRASSLANDS MODIFIED BY GRAZING

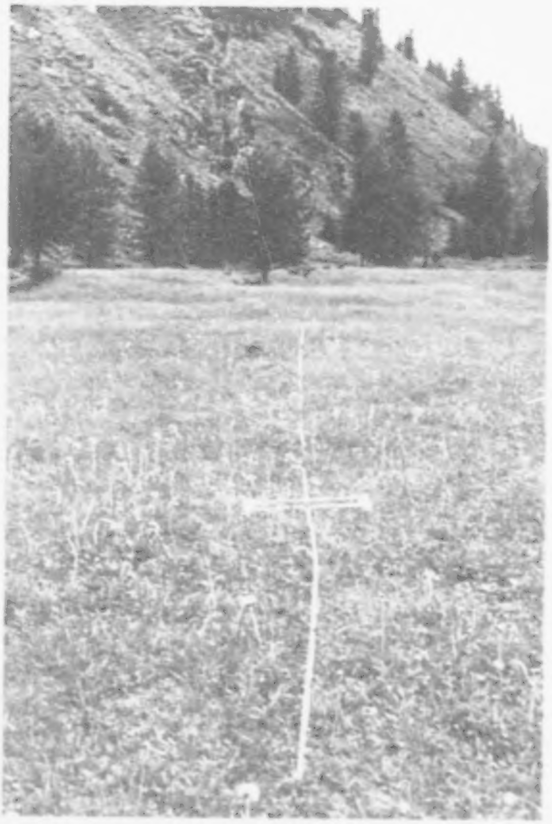


Figure 6. Heavily grazed Kentucky bluegrass/Dandelion community type

Grazing modified community types

The grazing modified community types in the Upper Foothills subregion are outlined in Table 3. There are a few grasslands that exhibit signs of historic heavy grazing. These sites are predominantly covered by Kentucky bluegrass, timothy, dandelion and clover plant species (UFC3. Kentucky bluegrass-sedge/ dandelion and UFC4. Kentucky bluegrass/ dandelion and UFC8. Kentucky bluegrass-Timothy/Veiny meadow rue). Under long-term moderate grazing pressure or heavy grazing over a couple of years, there is a general decline in rough fescue and tufted hairgrass and an increase in sedge and slender wheatgrass (UFC1 Slender wheatgrass-sedge/ strawberry and UFC11.Sedge-Slender wheatgrass-Rough fescue). When these plant communities are protected from grazing, they appear to succeed back to the original communities dominated by rough fescue and tufted hairgrass. However, when Kentucky bluegrass becomes established, the community appears to revert to a rough fescue or tufted hairgrass-Kentucky bluegrass-dominated plant community (UFC5. Tufted hairgrass-Kentucky bluegrass) when protected from grazing.

The climax range condition model suggests that vegetation development will be directional, predictable and revert to the original vegetation when protected from grazing, but once Kentucky bluegrass has established, bluegrass appears to compete with rough fescue and tufted hairgrass for co-dominance. These Kentucky bluegrass communities move toward a different community rather than back to the original vegetation when protected from livestock disturbance.

The Rocky Mtn. fescue/ graceful cinquefoil community (UFC2) appears to be a moderately to heavily grazed California oatgrass community type. The dry, gravelly conditions on this site do not appear to favour the growth of Kentucky bluegrass under heavy grazing conditions.

The Creeping red fescue/ Clover (UFC7) community type represents seeded pastures and pipelines within the Upper Foothills subregion. This community type usually occurs at lower elevations, adjacent to farms and ranches where extensive modification of the native grass and shrublands have taken place.

The Purple oatgrass-Rough fescue (UFC9) community type was described in the Ghost area west of Calgary. It appears to represent a rough fescue, hairy wildrye dominated grassland that has undergone heavy grazing pressure. Willoughby (2000) has described purple oatgrass communities on saline soils in the Dry Mixedwood subregion. It is possible that this community type maybe associated with a saline seepage area which favours the growth of purple oatgrass.

Table 3. Shrublands and grasslands modified by heavy grazing pressure in the Upper foothills subregion

Community number	Community type	Production(kg/ha) Grass	Forb	Shrub	Total	Moisture	Drainage	Carrying capacity (Ha/AUM)
ff1	**Ecological site phase grazed**	**1789**	**302**	**384**	**2926**	**Mesic**	**Well**	**1.5**
UFC2.	Rocky Mtn. fescue-Graceful cinquefoil				917	Subhygric	Well	1.0
UFC7.	Creeping red fescue-Clover	1804	210	801	2063	Mesic	Well	0.5
UFC11.	Sedge-Slender wheatgrass-Rough fescue	802	322	18	1207	Mesic	Well	1.1
ff2	**Ecological site phase grazed**	**1224**	**453**	**214**	**1915**	**Subhygric**	**Mod.well**	**0.5**
UFC10.	Willow/Kentucky bluegrass	1224	453	214	1915	Subhygric	Mod.well	0.5
g2	**Ecological site phase forb meadow**	**2833**	**1468**		**4312**	**Subhygric**	**Mod. Well**	**0.3**
UFC8.	Kentucky bluegrass-Timothy/Meadow rue	2833	1468		4312	Subhygric	Mod. Well	0.3
g3	**Ecological site phase grass meadow**	**2103**	**608**	**212**	**2744**	**Subhygric**	**Mod. Well**	**0.4**
UFC1.	Slender wheatgrass-Sedge/Low forbs	1752	451		1910	Mesic	Mod. Well	0.5
UFC3.	Kentucky bluegrass/Clover-Dandelion	2206	622	150	2837	Mesic	Mod. Well	0.3
UFC4.	Kentucky bluegrass-Sedge/Dandelion	1915	845	102	2767	Mesic	Mod. Well	0.3
UFC5.	Tufted hairgrass-Kentucky bluegrass	3292	1010		4302	Subhygric	Mod. Well	0.2
UFC6.	Sedge-Tufted hairgrass	1661	339		2000	Subhygric	Mod. Well	0.6
UFC9.	Purple oatgrass-Rough fescue	2052	302	384	2798	Submesic	Well	0.3

UFC1. Slender wheatgrass-Sedge/ Low forbs

(Agropyron trachycaulum-Carex spp./ Fragaria virginiana)

n=12 This community type appears to arise from grazing a modal fescue-tufted hairgrass community (UFA5). Moderate to heavy grazing causes fescue and hairgrass, both decreasers, to decline in the stand. This community is very common in the valley bottoms in areas that are heavily utilized. While still quite productive, these sites have lost two of the most advantageous species. Only a reduction in grazing pressure will once again allow fescue and tufted hairgrass to become prevalent in the stand.

PLANT COMPOSITION CANOPY COVER(%)

	MEAN	RANGE	CONST.
SHRUBS			
WILLOW (*Salix spp)*	3	0-25	30
FORBS			
STRAWBERRY *(Fragaria virginiana)*	11	0-25	67
YARROW *(Achillea millefolium)*	7	2-14	92
GRACEFUL CINQUEFOIL *(Potentilla gracilis)*	8	0-31	67
LINDLEY'S ASTER *(Aster ciliolatus)*	4	0-20	50
DANDELION *(Taraxacum officinale)*	2	0-8	42
MEADOW RUE (*Thalictrum venulosum*)	4	0-17	58
GRASSES			
SLENDER WHEATGRASS *(Agropyron trachycalum)*	24	1-58	100
TUFTED HAIRGRASS *(Deschampsia cespitosa)*	1	0-6	17
GRACEFUL SEDGE *(Carex praegracilis)*	21	0-47	83
KENTUCKY BLUEGRASS *(Poa pratensis)*	3	0-15	50
HAIRY WILDRYE (*Elymus innovatus*)	4	0-15	42
FRINGED BROME (*Bromus ciliatus*)	8	0-56	33

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
MESIC
NUTRIENT REGIME
MESOTROPHIC
ELEVATION:
1400-2438 M (1581 M)
SOIL DRAINAGE:
MODERATELY WELL
ASPECT:
SOUTHERLY
SLOPE:
0-27%

FORAGE PRODUCTION(KG/HA)

GRASS: 1752 (824-2548)
FORBS: 451 (50-869)
TOTAL: 1910 (920-2900)

ECOLOGICALLY SUSTAINABLE STOCKING RATE
0.5 HA/AUM OR 1.2 ACRES/AUM

UFC2. Rocky Mountain fescue/ Graceful cinquefoil

(Festuca brachyphylla/ Potentilla gracilis)

n=1 This community type was described on a gravelly, well drained site adjacent to Fall creek. It appears that this site was once a California oatgrass-sedge community type (UFA8), but heavy grazing pressure has shifted the community to one dominated by unpalatable low growing graminoids and forbs (Rocky mountain fescue, sedge, yarrow, graceful cinquefoil, pussy toes). The dry site conditions and poor nutrient conditions do not favour the growth of Kentucky bluegrass. This community type would benefit from a deferred rotational grazing system, where the community is rested every other year.

PLANT COMPOSITION

PLANT COMPOSITION	CANOPY COVER(%)		
	MEAN	RANGE	CONST.
FORBS			
WILD STRAWBERRY *(Fragaria virginiana)*	2	-	100
GRACEFUL CINQUEFOIL *(Potentilla gracilis)*	13	-	100
YARROW *(Achillea millefolium)*	8	-	100
ALPINE MILKVETCH *(Astragalus alpinus)*	6	-	100
ROSEY PUSSY TOES *(Antennaria rosea)*	2	-	100
RED SEEDED DANDELION *(Taraxacum laevigatum)*	2	-	100
GRASSES			
ROCKY MOUNTAIN FESCUE *(Festuca brachyphylla)*	21	-	100
BROWNISH SEDGE *(Carex brunnescens)*	5	-	100
SLENDER WHEATGRASS *(Agropyron trachycalum)*	4	-	100
CALIFORNIA OATGRASS *(Danthonia californica)*	4	-	100

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
SUBHYGRIC
NUTRIENT REGIME:
MESOTROPHIC
ELEVATION:
1350 M
SOIL DRAINAGE :
WELL

FORAGE PRODUCTION(KG/HA)

TOTAL: 917

ECOLOGICALLY SUSTAINABLE STOCKING RATE
1.0 HA/AUM OR 2.2 ACRES/AUM

UFC3. Kentucky bluegrass/ Clover-Dandelion

(Poa pratensis/ Trifolium spp.-Taraxacum officinale)

n=23 This community type develops when the modal tufted hairgrass-sedge dominated communities (UFA3, UFA4) are grazed heavily for prolonged periods of time. Willoughby (1992), felt these grasslands exhibited signs of historic heavy grazing pressure. He felt that under long-term moderate grazing or heavy grazing over a couple of years, rough fescue and tufted hairgrass decline and sedge, slender wheatgrass, and low growing forbs increase. When these plant communities are protected from grazing, they appear to succeed back to the original communities dominated by rough fescue and tufted hairgrass. However, when Kentucky bluegrass becomes established the community appears to revert to a rough fescue or tufted hairgrass-Kentucky bluegrass dominated plant community (UFC5).

These community types are highly productive for domestic livestock during the growing season, but the poor quality of Kentucky bluegrass, particularly in the dormant season, limits the use of these community types for wildlife.

PLANT COMPOSITION CANOPY COVER(%)

	MEAN	RANGE	CONST.
FORBS			
DANDELION *(Taraxacum officinale)*	15	6-37	100
WILD STRAWBERRY *(Fragaria virginiana)*	3	0-21	61
CLOVER *(Trifolium repens)*	15	0-52	74
YARROW *(Achillea millefolium)*	7	0-15	96
GRACEFUL CINQUEFOIL *(Potentilla gracilis)*	6	0-25	83
VEINY MEADOW RUE *(Thalictrum venulosum)*	4	0-21	61
GRASSES			
KENTUCKY BLUEGRASS *(Poa pratensis)*	48	0-97	96
SLENDER WHEATGRASS *(Agropyron trachycaulum)*	4	0-26	65
CREEPING RED FESCUE *(Festuca rubra)*	3	0-26	30
TUFTED HAIRGRASS *(Deschampsia cespitosa)*	1	0-4	22

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
MESIC
NUTRIENT REGIME:
MESOTROPHIC
ELEVATION:
1150-1600 M (1276 M)
SOIL DRAINAGE:
MODERATELY WELL
ASPECT:
VARIABLE
SLOPE:
0-35%

FORAGE PRODUCTION(KG/HA)

GRASS: 2206 (621-4319)
FORBS: 622 (153-2102)
SHRUBS: 150
TOTAL: 2837 (1014-4686)

ECOLOGICALLY SUSTAINABLE STOCKING RATE
0.3 HA/AUM OR 0.7 ACRES/AUM

UFC4. Kentucky bluegrass-Sedge/ Dandelion

(Poa pratensis-Carex spp./ Taraxacum officinale)

n=33 This community type is similar to the Kentucky bluegrass/ clover-dandelion community type (UFC3), but it has not been grazed as heavily. There is still an abundance of native plant species such as veiny meadow rue, slender wheatgrass, tufted hairgrass and sedge, but there has been an increase in grazing resistant species, such as Kentucky bluegrass, dandelion and clover. If this community type is protected from grazing it will probably revert back to a tufted hairgrass-Kentucky bluegrass dominated type (UFC5) (Willoughby, 1992). Kentucky bluegrass, once established, appears to be a successful competitor.

These Kentucky bluegrass dominated community types are very productive, but they have lost two of the most advantageous species (tufted hairgrass and rough fescue). The forage quality of these native species is much better, particularly in the dormant season.

PLANT COMPOSITION CANOPY COVER(%)

	MEAN	RANGE	CONST.
SHRUBS			
SHRUBBY CINQUEFOIL *(Potentilla fruticosa)*	2	0-6	58
PRICKLY ROSE *(Rosa acicularis)*	1	0-19	12
FORBS			
DANDELION *(Taraxacum officinale)*	20	1-53	97
YARROW *(Achillea millefolium)*	8	1-25	100
STRAWBERRY *(Fragaria virginiana)*	5	0-14	73
VEINY MEADOW RUE *(Thalictrum venulosum)*	8	0-41	73
GRACEFUL CINQUEFOIL *(Potentilla gracilis)*	12	0-40	88
GRASSES			
KENTUCKY BLUEGRASS *(Poa pratensis)*	33	0-85	97
SLENDER WHEATGRASS *(Agropyron trachycaulum)*	5	0-29	73
TUFTED HAIRGRASS *(Deschampsia cespitosa)*	6	0-21	67
SEDGE SPP. *(Carex spp.)*	19	0-73	75
ROUGH FESCUE *(Festuca scabrella)*	3	0-12	46

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
MESIC
NUTRIENT REGIME
PERMESOTROPHIC
ELEVATION:
1150-1660 M (1464 M)
SOIL DRAINAGE:
MODERATELY WELL
SLOPE: 0-12%
ASPECT: VARIABLE

FORAGE PRODUCTION(KG/HA)

GRASS: 1869 (632-4304)
FORBS: 865 (264-3344)
SHRUBS: 10(0-102)
TOTAL: 2767 (1491-4864)

ECOLOGICALLY SUSTAINABLE STOCKING RATE
0.3 HA/AUM OR 0.7 ACRES/AUM

UFC5. Tufted hairgrass-Kentucky bluegrass

(Deschampsia cespitosa-Poa pratensis)

n=13 This community type is similar to the other Kentucky bluegrass dominated community types, but grazing pressure has been lighter or it was heavy and then became more moderate because of reduced stocking rates or rotational grazing. Willoughby (1992), found that tufted hairgrass could compete with Kentucky bluegrass in the absence of grazing, but it appears that once Kentucky bluegrass is established it remains to form a stable community type.

PLANT COMPOSITION CANOPY COVER(%)

	MEAN	RANGE	CONST.
SHRUBS			
SHRUBBY CINQUEFOIL *(Potentilla fruticosa)*	1	0-5	62
BOG BIRCH *(Betula glandulosa)*	3	0-16	39
FORBS			
DANDELION *(Taraxacum officinale)*	16	3-21	100
YARROW *(Achillea millefolium)*	4	T-5	100
STRAWBERRY *(Fragaria virginiana)*	5	0-14	85
VEINY MEADOW RUE *(Thalictrum venulosum)*	4	T-10	100
GRACEFUL CINQUEFOIL *(Potentilla gracilis)*	7	0-18	85
GRASSES			
KENTUCKY BLUEGRASS *(Poa pratensis)*	7	2-19	100
SLENDER WHEATGRASS *(Agropyron trachycaulum)*	7	0-13	85
TUFTED HAIRGRASS *(Deschampsia cespitosa)*	36	12-68	100
SEDGE SPP. *(Carex spp.)*	6	1-17	100
ROUGH FESCUE *(Festuca scabrella)*	2	0-5	69

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
SUBHYGRIC
NUTRIENT REGIME:
PERMESOTROPHIC
ELEVATION:
1300-1523 M (1467 M)
SOIL DRAINAGE:
MODERATELY WELL
ASPECT:
NORTH

FORAGE PRODUCTION(KG/HA)

GRASS: 3292
FORBS: 1010
TOTAL: 4302

ECOLOGICALLY SUSTAINABLE STOCKING RATE
0.2 HA/AUM OR 0.5 ACRES/AUM

UFC6. Sedge-Tufted hairgrass

(Carex spp.-Deschampsia cespitosa)

n=14 This community type was described at Harrison Flats in the Upper Clearwater River valley. It appears to represent a tufted hairgrass-sedge community that was heavily grazed in the past and now is rested and only lightly utilized. It appears that the heavy grazing pressure was not prolonged enough to allow Kentucky bluegrass invasion. It is also possible that Kentucky bluegrass is not predominant on this site because of lack of seed source in these isolated areas. It is likely, with continued protection from grazing, that this community type will succeed back to a modal tufted hairgrass-sedge dominated community type.

PLANT COMPOSITION CANOPY COVER(%)

	MEAN	RANGE	CONST.
SHRUBS			
SHRUBBY CINQUEFOIL *(Potentilla fruticosa)*	2	0-6	64
FORBS			
DANDELION *(Taraxacum officinale)*	8	0-22	71
YARROW *(Achillea millefolium)*	10	0-41	86
STRAWBERRY *(Fragaria virginiana)*	5	0-10	57
VEINY MEADOW RUE *(Thalictrum venulosum)*	12	0-38	64
GRACEFUL CINQUEFOIL *(Potentilla gracilis)*	5	0-26	50
GRASSES			
KENTUCKY BLUEGRASS *(Poa pratensis)*	1	0-5	29
SLENDER WHEATGRASS *(Agropyron trachycaulum)*	3	0-13	36
TUFTED HAIRGRASS *(Deschampsia cespitosa)*	20	0-46	93
SEDGE *(Carex spp.)*	59	0-93	100
ROUGH FESCUE *(Festuca scabrella)*	7	0-19	64
BALTIC RUSH *(Juncus balticus)*	14	0-58	100

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
SUBHYGRIC
NUTRIENT REGIME:
MESOTROPHIC
ELEVATION:
1505-1829 M (1779 M)
SOIL DRAINAGE:
IMPERFECTLY
ASPECT:
VARIABLE
SLOPE:
0%

FORAGE PRODUCTION(KG/HA)

GRASS: 1681(684-3208)
FORBS: 405(72-891)
SHRUBS: 108(0-322
TOTAL: 2104(932-3356)

ECOLOGICALLY SUSTAINABLE STOCKING RATE
0.4 HA/AUM OR 0.9 ACRES/AUM

UFC7. Creeping red fescue-Clover

(Festuca rubra-Trifolium spp.)

n=28 This community type was described at lower elevations, adjacent to farms and ranches in the Upper Foothills subregion. This community represents native communities that have been disturbed and planted to creeping red fescue. These include pipelines, roadsides and cultivated pastures. Lane et al. (2000), felt this community type developed when a site which was seeded to creeping red fescue-timothy-clover and received low levels of use. Creeping red fescue spreads throughout the site by creeping rhizomes and chokes out the timothy by forming a dense matt of litter. This community type is normally considered to be in good or excellent condition.

PLANT COMPOSITION CANOPY COVER(%)

	MEAN	RANGE	CONST.
FORBS			
DANDELION *(Taraxacum officinale)*	5	0-21	82
YARROW *(Achillea millefolium)*	2	0-7	64
STRAWBERRY *(Fragaria virginiana)*	3	0-12	64
CLOVER SPP. *(Trifolium spp)*	16	0-49	100
GRACEFUL CINQUEFOIL *(Potentilla gracilis)*	1	0-7	29
GRASSES			
KENTUCKY BLUEGRASS *(Poa pratensis)*	16	0-58	86
CREEPING RED FESCUE *(Festuca rubra)*	34	6-87	100
TUFTED HAIRGRASS *(Deschampsia cespitosa)*	1	0-4	25
SEDGE SPP. *(Carex spp.)*	1	0-11	50
HAIRY WILD RYE *(Elymus innovatus)*	2	0-17	25
TIMOTHY *(Phleum pratense)*	4	0-31	61

ENVIRONMENTAL VARIABLES

MOISTURE REGIME
MESIC
NUTRIENT REGIME:
MESOTROPHIC
ELEVATION:
1212-1880 M (1450 M)
SOIL DRAINAGE:
WELL
ASPECT:
VARIABLE
SLOPE:
0-40%

FORAGE PRODUCTION(KG/HA)

GRASS: 1864 (332-4894)
FORBS: 290 (20-999)
SHRUBS: 30(0-384
TOTAL: 2063(404-5054)

ECOLOGICALLY SUSTAINABLE STOCKING RATE
0.5 HA/AUM OR 1.0 ACRES/AUM

UFC8. Kentucky bluegrass-Timothy/ Meadow rue

(Poa pratensis-Phleum pratense/ Thalictrum venulosum)

n=4 This community type represents the grazed and disturbed community of the cow parsnip-meadow rue/ fringed brome community (UFA14). The high productivity and open nature of this community make it extremely attractive to domestic livestock. Heavy to moderate grazing pressure causes cow parsnip, veiny meadow rue and fringed brome to decrease and allows Kentucky bluegrass, timothy and dandelion to increase.

PLANT COMPOSITION

	Canopy Cover(%)		
	Mean	Range	Const.
Shrubs			
Willow *(Salix spp.)*	2	0-5	75
Forbs			
Dandelion *(Taraxacum officinale)*	13	2-35	100
Cow parsnip *(Heracleum lanatum)*	7	0-23	50
Strawberry *(Fragaria virginiana)*	1	0-1	50
Clover *(Trifolium repens. T. hybridum)*	5	0-20	25
Veiny meadow rue *(Thalictrum venulosum)*	7	0-24	50
Grasses			
Kentucky bluegrass *(Poa pratensis)*	22	0-33	75
Slender wheatgrass *(Agropyron trachycaulum)*	7	0-16	75
Smooth brome *(Bromus inermis)*	2	0-7	25
Timothy *(Phleum pratense)*	17	11-25	100

ENVIRONMENTAL VARIABLES

Moisture Regime:
Mesic
Nutrient Regime:
Permesotrophic
Elevation:
1060-15201m (1330 m)
Soil Drainage:
Moderately well
Aspect:
Variable
Slope:
0-6%

FORAGE PRODUCTION(KG/HA)

Grass: 2834 (308-6322)
Forbs: 1469 (210-2830)
Shrubs: 42
Total: 4313 (560-6942)

Ecologically sustainable Stocking Rate
0.3 ha/AUM or 0.7 acres/AUM

UFC9. Purple oatgrass-Rough fescue

(Schizachne purpurascens -Festuca scabrella)

n=1 This community type was described in the Ghost area west of Calgary. It appears to represent a rough fescue, hairy wildrye dominated grassland that has undergone heavy grazing pressure. Willoughby (1995) has found that purple oatgrass will increase with increased grazing pressure on nutrient poor soils in the Lower Foothills subregion. Willoughby (2000) also described a purple oatgrass-california oatgrass dominated community type on saline soils in the Dry Mixedwood subregion. It is possible that this community type maybe associated with a saline seepage area which favours the growth of purple oatgrass.

This community type is fairly productive, but the majority of the production is coming from purple oatgrass which is only moderately palatable to livestock. This community type should probably be rated as secondary range.

PLANT COMPOSITION CANOPY COVER(%)

	MEAN	RANGE	CONST.
SHRUBS			
SHRUBBY CINQUEFOIL (*Potentilla fruticosa*)	6	-	100
FORBS			
THREE FLOWERED AVENS *(Geum triflorum)*	4	-	100
GRACEFUL CINQUEFOIL *(Potentilla gracilis)*	3	-	100
YARROW *(Achillia millifolium)*	3	-	100
SMOOTH ASTER *(Aster laevis)*	2	-	100
GRASSES			
PURPLE OAT GRASS (Schizachne purpurascens)	15	-	100
SLENDER WHEATGRASS (Agropyron trachycaulum)	10	-	100
ROUGH FESCUE (Festuca scabrella)	7	-	100
PRESL SEDGE (*Carex preslii*)	5	-	100
JUNEGRASS *(Koeleria macrantha)*	1	-	100

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
SUBMESIC
NUTRIENT REGIME:
MESOTROPHIC
ELEVATION:
1460
SOIL DRAINAGE:
WELL
ASPECT:
SOUTHERLY
SLOPE:
25%

FORAGE PRODUCTION(KG/HA)

GRASS: 2052
FORBS: 362
SHRUBS: 384
TOTAL: 2798

ECOLOGICALLY SUSTAINABLE STOCKING RATE
0.3 Ha/AUM or 0.7 Ac/AUM

UFC10. Willow/ Kentucky bluegrass

(Salix spp./Poa pratensis)

n=3 This community type represents the grazed and disturbed community of the willow/ tufted hairgrass-sedge community type (UFB3). The high productivity and open nature of this community make it extremely attractive to domestic livestock. Heavy to moderate grazing pressure causes the native plant species to decrease and allows Kentucky bluegrass and dandelion to increase.

PLANT COMPOSITION CANOPY COVER(%)

	MEAN	RANGE	CONST.
SHRUBS			
WILLOW *(Salix spp.)*	20	17-25	100
FORBS			
DANDELION *(Taraxacum officinale)*	9	1-21	100
YARROW *(Achillea millefolium)*	7	5-7	100
STRAWBERRY *(Fragaria virginiana)*	2	T-4	100
WHITE CLOVER *(Trifolium repens)*	4	0-10	67
TALL LUNGWORT *(Mertensia paniculata)*	4	0-10	67
GRASSES			
KENTUCKY BLUEGRASS *(Poa pratensis)*	15	10-20	100
SLENDER WHEATGRASS *(Agropyron trachycaulum)*	7	5-12	100
TUFTED HAIRGRASS *(Deschampsia cespitosa)*	5	0-15	33
SHEEP FESCUE *(Festuca saximontana)*	3	0-10	33

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
MESIC-SUBHYGRIC
NUTRIENT REGIME:
PERMESOTROPHIC
ELEVATION:
1370-1667 M (1518 M)
SOIL DRAINAGE:
WELL
ASPECT:
VARIABLE
SLOPE:
0-25%

FORAGE PRODUCTION(KG/HA)

GRASS: 1224 (880-1568)
FORBS: 453 (316-590)
SHRUBS: 241(0-429)
TOTAL: 1915 (1196-2798)

ECOLOGICALLY SUSTAINABLE STOCKING RATE
0.5 HA/AUM OR 1.1 ACRES/AUM

UFC11. Sedge-Slender wheatgrass-Rough fescue

(Carex spp.-Agropyron trachycaulum-Festuca scabrella)

n=34 This community type represents the grazed transects at the McCue Creek, Yara Creek and Upper James River rangeland reference areas over 30 years from the 1960's to the early 1980's. The continued grazing pressure since the 1980's has allowed Kentucky bluegrass to invade onto these sites to form a Kentucky bluegrass-Sedge dominated community type (Willoughby 2000). In the 1960's when these sites were protected from grazing the plant community succeeded back to a rough fescue-hairy wildrye dominated community.

PLANT COMPOSITION CANOPY COVER(%)

	MEAN	RANGE	CONST.
SHRUBS			
SHRUBBY CINQUEFOIL (*Potentilla fruticosa.*)	2	0-10	68
FORBS			
DANDELION *(Taraxacum officinale)*	3	0-13	88
YARROW *(Achillea millefolium)*	3	0-7	97
STRAWBERRY *(Fragaria virginiana)*	2	0-18	47
GRACEFUL CINQUEFOIL (*Potentilla gracilis)*	3	0-8	82
AMERICAN VETCH *(Vicia americana)*	3	0-16	88
GRASSES			
KENTUCKY BLUEGRASS *(Poa pratensis)*	3	0-16	56
SLENDER WHEATGRASS *(Agropyron trachycaulum)*	8	1-19	100
ROUGH FESCUE *(Festuca scabrella)*	7	1-32	100
SEDGE SPP. (*Carex spp.*)	10	0-31	72
HAIRY WILDRYE (*Elymus innovatus)*	3	0-20	35

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
MESIC
NUTRIENT REGIME:
MESOTROPHIC
ELEVATION:
1444-1660(1521M)
SOIL DRAINAGE:
WELL
ASPECT:
SOUTHERLY
SLOPE:
2-22%

FORAGE PRODUCTION(KG/HA)

GRASS:	802
FORBS:	322
SHRUBS:	82
TOTAL:	1207

ECOLOGICALLY SUSTAINABLE STOCKING RATE
1.1 HA/AUM OR 2.5 ACRES/AUM

UPPER FOOTHILLS SUBREGION

DECIDUOUS COMMUNITY TYPES

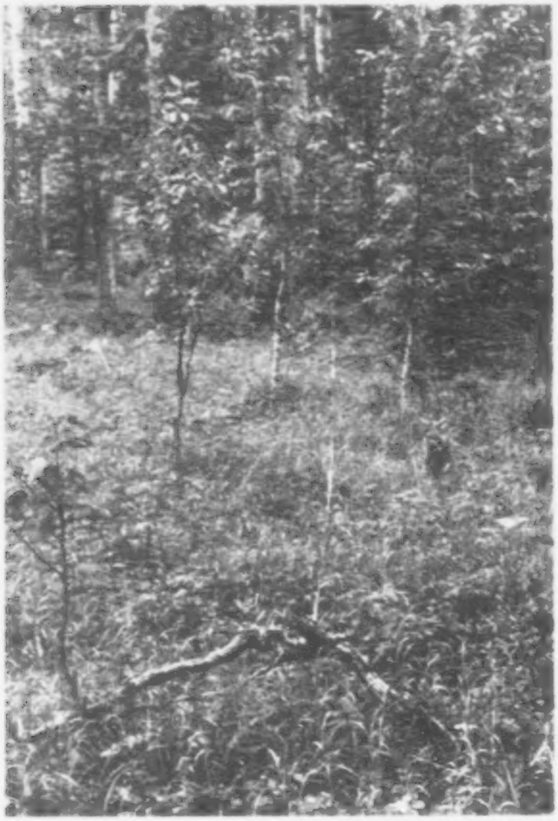


Figure 7. Aspen/Marsh reedgrass community type on south facing slopes in the Upper Foothills subregion

Deciduous community types

The seven deciduous community types described in the Upper Foothills subregion are outlined in Table 4. Deciduous types are rare in this subregion. The cool climate severely restricts the growth of deciduous tree species (Strong and Leggat 1992). As a result, aspen and balsam poplar are generally found on south facing slopes where the increased insolation permits colonization.

The Pb-Sw/ Willow/ Yellow Mtn. avens community type (UFD2) is representative of the gravelly floodplains adjacent to rivers and streams. The Aw/ Rose/ Bearberry, Aw/ Rose/ Hairy wildrye and Aw/ Buffaloberry/ Hairy wildrye community types are found on dry south facing slopes throughout the region. The Aw/ Buffaloberry/ Hairy wildrye community type appears to be successionally more advanced, with slightly acidic soils, than the Aw/ Rose/ Hairy wildrye community type. The Aw/ Marsh reedgrass type is slightly moister than the other aspen community types found on south facing slopes in the Upper Foothills subregion and the Pb/ Willow/ Horsetail was described on the river floodplain adjacent to the Wildhay river. The Aw-Pl/Bunchberry (UFD7) represents a mixedwood community that is undergoing succession to a lodgepole pine dominated forest. This successional sequence is typical of south facing slopes throughout the Upper foothills subregion.

Key to Deciduous Community Types

1. balsam poplar dominates the overstory. 2
   Drier sites with Aspen dominating the overstory 3

2. Low nutrient, dry gravelly river floodplains .. UFD2 Balsam poplar-White spruce/ Willow/ Yellow mtn. Avens
   Moist, moderately well drained soils .... UFD6 Balsam poplar/ Willow/ horsetail

3. Dry , south and west facing slopes 4
   Moister richer sites with Marsh reedgrass dominated understory .... UFD5 Aspen/ Marsh reedgrass

4. Bearberry or Buffaloberry dominate understory. 5
   Grass and forbs dominate the understory of this dry, sunny site 6

5. Dry site conditions on steep south facing slope .... UFD1 Aspen/ Rose/ Bearberry
   Lower, south facing slopes and lower nutrient soils (high pH) .... UFD4 Aspen/ Buffaloberry/ Hairy wildrye

6. Deciduous site with understory dominated by hairy wildrye..........UFD3 Aspen/ Rose/ Hairy wildrye
   Mixedwood site with Aw and Pl..........UFD7 Aw-Pl/Bunchberry

Table 4. Forage production (kg/ha) for the deciduous community types and ecosite phases within the Upper Foothills subregion

Community number	Community type	Productivity(kg/ha) Grass	Forb	Shrub	Total	Moisture	Drainage	Carrying capacity(Ha/AUM)
c2	**Ecological site phase hairy wildrye Aw**	**503**	**329**	**116**	**1039**	**Submesic**	**Well**	**1.8**
UFDI	Aw/Rose/Bearberry	450	300	114	864	Submesic	Well	2.1
UFD3	Aw/Rose/Hairy wildrye	660	339	34	1303	Mesic	Mod. Well	1.4
UFD4	Aw/Buffaloberry/Hairy wildrye	400	350	200	950	Submesic	Well	1.9
c5	**Ecological site phase yellow mtn avens**	**62**	**316**	**230**	**608**	**Mesic**	**Imperfectly**	**3.0**
UFD2	Pb-Sw/Willow/Yellow Mtn. Avens	62	316	230	608	Mesic	Imperfectly	3.0
e2	**Ecological phase tall bilberry Aw-Pl-Sw**				**900**	**Mesic**	**Well**	**2.0**
UFD7	Aw-Pl/Bunchberry	219	278	400	901	Mesic	Well	2.0
f2	**Ecological site phase bracted honeysuckle Aw**	**206**	**776**	**110**	**1092**	**Subhygric**	**Mod. Well**	**1.6**
UFD5.	Aw/Marsh reedgrass	206	776	110	1092	Subhygric	Mod. Well	1.6
j2	**Ecological site phase horsetail Pb**	**50**	**550**	**150**	**750**	**Subhygric**	**Mod. Well**	**2.4**
UFD6.	Pb/Willow/Horsetail	50	550	150	750	Subhygric	Mod. Well	2.4

UFD1. Aspen/ Rose/ Bearberry

(Populus tremuloides/ Rosa acicularis/ Arctostaphylos uva-ursi)

n=1 This community type was described on the steep south facing slope above Rough Creek, west of Rocky Mountain House. The drier site conditions favour the growth of bearberry. This community type probably represents an earlier successional phase of the Pl/ bearberry community type described by Beckingham et al (1996). The forage productivity of this community type is only moderate, but the openness of the stand makes it accessible for livestock. This community type would be rated as secondary range.

PLANT COMPOSITION CANOPY COVER(%)

	MEAN	RANGE	CONST.
TREES			
ASPEN *(Populus tremuloides)*	47	-	100
SHRUBS			
PRICKLY ROSE *(Rosa acicularis)*	22	-	100
BEARBERRY *(Arctostaphylos uva-ursi)*	16	-	100
FORBS			
STRAWBERRY *(Fragaria virginiana)*	7	-	100
LINDLEY'S ASTER *(Aster ciliolatus)*	1	-	100
FIREWEED *(Epilobium angustifolium)*	11	-	100
YARROW *(Achillea millefolium)*	3	-	100
GRASSES			
SLENDER WHEATGRASS *(Agropyron trachycaulum)*	5	-	100
FRINGED BROME *(Bromus ciliatus)*	3	-	100
ROUGH FESCUE *(Festuca scabrella)*	3	-	100

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
MESIC
NUTRIENT REGIME:
MESOTROPHIC
ELEVATION:
1215 M
SOIL DRAINAGE:
WELL
ASPECT:
SOUTH-EAST
SLOPE:
30%

FORAGE PRODUCTION(KG/HA)

GRASS: 450
FORBS: 300
SHRUBS: 114
TOTAL: 864

ECOLOGICALLY SUSTAINABLE STOCKING RATE
2.1 HA/AUM OR 5.1 ACRES/AUM

UFD2. Balsam poplar/ Willow/ Yellow Mountain Avens

(Populus balsamifera/ Salix spp./ Dryas drummondii)

n=1 This community type is common throughout the Upper Foothills subregion on gravelly floodplains along rivers and streams. It is similar to the bearberry/ slender wheatgrass community (UFA10), but it is successionally more advanced. This type is dominated by balsam poplar with an understory of spruce in the later successional stages. This particular stand was fairly young with the tree canopy being less than 5 m tall. Yellow mountain avens is a common pioneer species on gravelly river bars and rocky slopes up into the alpine tundra (MacKinnon et al., 1992). As this community succeeds towards a mature forest, yellow mountain avens will undoubtably decline in cover.

The forage production on this community type is very low. The poor nutrient status of the soil limits the growth of grasses, forbs and shrubs. As a result, this community type would be rated as non-use range.

PLANT COMPOSITION CANOPY COVER(%)

	MEAN	RANGE	CONST.
TREES			
BALSAM POPLAR *(Populus balsamifera)*	7	-	100
WHITE SPRUCE *(Picea glauca)*	5	-	100
SHRUBS			
WILLOW *(Salix spp.)*	13	-	100
BUFFALOBERRY *(Shepherdia canadensis)*	9	-	100
YELLOW MOUNTAIN AVENS *(Dryas drummondii)*	16	-	100
BEARBERRY *(Arctostaphylos uva-ursi)*	3	-	100
FORBS			
WILD STRAWBERRY (*Fragaria virginiana*)	1	-	100
ALPINE HEDYSARUM *(Hedysarum alpinum)*	11	-	100
SCOURING RUSH *(Equisetum scirpoides)*	11	-	100
ALPINE MILKVETCH *(Astragalus alpinus)*	4	-	100
GRASSES			
BLUNT SEDGE *(Carex obtusata)*	2	-	100

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
MESIC
NUTRIENT REGIME:
PERMESOTROPHIC
ELEVATION:
1524 M
SOIL DRAINAGE:
IMPERFECTLY

FORAGE PRODUCTION(KG/HA)

GRASS:	62
FORBS:	316
SHRUBS:	230
TOTAL:	608

ECOLOGICALLY SUSTAINABLE STOCKING RATE
3 HA/AUM OR 7 ACRES/AUM

UFD3. Aspen/ Rose/ Hairy wildrye

(Populus tremuloides/ Rosa acicularis/ Elymus innovatus)

n=14 This community type is typical of aspen forest types found throughout the Upper Foothills subregion on south facing slopes. The dry site conditions and high solar insolation favours the growth of grasses and forbs rather than shrubs. The canopy cover of aspen is also noticeably lower on this community type. This community type is similar to the Aw/ buffaloberry/ hairy wildrye community (UFD4)described in Willmore Wilderness Park, but the absence of buffaloberry distinguishes this type from the Willmore type. This community is moderately productive for domestic livestock. This community would be rated as secondary range.

PLANT COMPOSITION CANOPY COVER(%)

	MEAN	RANGE	CONST.
TREES			
ASPEN			
(Populus tremuloides)	38	10-72	100
SHRUBS			
PRICKLY ROSE			
(Rosa acicularis)	2	0-7	81
WILLOW .			
(Salix spp.)	1	0-10	29
FORBS			
LINDLEY'S ASTER			
(Aster ciliolatus)	4	0-18	43
WILD STRAWBERRY			
(Fragaria virginiana)	10	1-33	100
TALL LUNGWORT			
(Mertensia paniculata)	3	0-12	86
CREAM COLORED VETCHLING			
(Lathyrus ochroleucus)	2	1-10	86
VEINY MEADOW RUE			
(Thalictrum venulosum)	3	0-9	73
GRASSES			
HAIRY WILD RYE			
(Elymus innovatus)	17	0-62	93
PURPLE OATGRASS			
(Schizachne purpurascens)	3	0-20	28
SLENDER WHEATGRASS			
(Agropyron trachycaulum)	2	0-26	21

ENVIRONMENTAL VARIABLES

MOISTURE REGIME
MESIC
NUTRIENT REGIME
MESOTROPHIC
ELEVATION:
1220-1587 M (1440 M)
SOIL DRAINAGE (MEAN):
MODERATELY WELL
ASPECT:
SOUTH TO SOUTHWEST
SLOPE:
0-35%

FORAGE PRODUCTION(KG/HA)

GRASS: 660(200-1882)
FORBS: 339 (0-1000)
SHRUBS: 34 (0-300)
TOTAL: 1303 (401-1882)

ECOLOGICALLY SUSTAINABLE STOCKING RATE
1.4 HA/AUM

UFD4. Aspen/ Buffaloberry/ Hairy wildrye

(Populus tremuloides/ Shepherdia canadensis/ Elymus innovatus)

n=3 This community type was described along lower, south facing slopes and river terraces throughout Willmore Wilderness Park and areas west of Hinton. Bork (1994), found this community type. to be uncommon throughout Willmore, but pockets of this type were found along the Smoky, Sulphur and Sheep rivers on the North side of the Park. Bork felt that frequent disturbance and/ or arid conditions resulted in the aspen dominated overstory. He felt if left undisturbed, the community type would eventually succeed to a coniferous forest. This community type is very similar to the Aw/ buffaloberry type described by Youngblood (1993) in Alaska and the Aw/ rose/ hairy wildrye community type (UFD3) previously described near Rocky Mtn. House. The presence of buffaloberry distinguishes this northern type from the more southern rose type. The presence of buffaloberry may indicate a higher pH and lower nutrient status. Beckingham (1994), described Aw/ buffaloberry stands on lower pH sites.

This community type provides a good forage base for domestic livestock. In the Upper foothills, this community type is often located in close proximity to the trails and camps used by outfitters and recreationalists.

PLANT COMPOSITION CANOPY COVER(%)

	MEAN	RANGE	CONST.
TREES			
ASPEN *(Populus tremuloides)*	34	24-52	100
WHITE SPRUCE *(Picea glauca)*	4	0-11	33
SHRUBS			
BUFFALOBERRY *(Shepherdia canadensis)*	14	10-18	100
PRICKLY ROSE *(Rosa acicularis)*	7	1-7	100
WILLOW *(Salix spp.)*	17	5-36	100
TWIN-FLOWER *(Linnaea borealis)*	1	0-4	33
BUNCHBERRY *(Cornus canadensis)*	2	0-7	33
FORBS			
FIREWEED *(Epilobium angustifolium)*	3	1-5	100
SHOWY ASTER *(Aster conspicuus)*	1	0-4	33
STRAWBERRY *(Fragaria virginiana)*	9	3-19	100
GRASSES			
HAIRY WILD RYE *(Elymus innovatus)*	24	14-34	100
MARSH REEDGRASS *(C.alamagrostis canadensis)*	3	0-5	50

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
MESIC
NUTRIENT REGIME:
MESOTROPHIC
ELEVATION:
914-1500 M (957 M)
SOIL DRAINAGE:
WELL
ASPECT:
SOUTH
SLOPE:
0-10%

FORAGE PRODUCTION(KG/HA)

GRASS: 400
FORBS: 350
SHRUBS: 200
TOTAL: 950

ECOLOGICALLY SUSTAINABLE STOCKING RATE
1.9 HA/AUM

UFD5. Aspen/ Marsh reedgrass

(Populus tremuloides/ Calamagrostis canadensis)

n=4 This community type was described on a south facing slope in the Solomon valley west of Hinton and observed near Fall Creek and Upper James west of Rocky Mountain House. This community type is scattered throughout the valleys in small isolated areas. It appears to have a slightly higher moisture regime than the bearberry, hairy wildrye and buffaloberry dominated community types previously described. The dominance of marsh reedgrass indicates that some nutrient rich seepage occurs at some point in the growing season. This community type was located adjacent to Kentucky bluegrass-timothy dominated meadows (UFC8). As a result, this aspen dominated community type was extensively utilized by livestock.

PLANT COMPOSITION CANOPY COVER(%)

	MEAN	RANGE	CONST.
TREES			
ASPEN *(Populus tremuloides)*	29	14-45	100
BALSAM POPLAR *(Populus balsamifera)*	3	0-8	75
WHITE SPRUCE *(Picea glauca)*	7	0-13	75
SHRUBS			
PRICKLY ROSE *(Rosa acicularis)*	1	0-3	75
WILLOW *(Salix spp.)*	3	0-8	50
FORBS			
CANADA VIOLET *(Viola canadensis)*	4	0-17	50
PEAVINE *(Lathyrus ochroleucus)*	3	0-5	75
TALL LUNGWORT *(Mertensia paniculata)*	3	T-6	100
LINDLEY'S ASTER *(Aster ciliolatus)*	5	0-13	50
STRAWBERRY *(Fragaria virginiana)*	4	1-9	100
COW PARNSIP (*Heracleum lanatum*)	3	0-10	50
GRASSES			
HAIRY WILD RYE *(Elymus innovatus)*	6	3-10	100
MARSH REEDGRASS *(Calamagrostis canadensis)*	14	4-20	100

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
SUBHYGRIC
NUTRIENT REGIME:
PERMESOTROPHIC
ELEVATION:
1450-1500 M (1477 M)
SOIL DRAINAGE:
MODERATELY WELL
ASPECT:
WEST
SLOPE:
3-18%

FORAGE PRODUCTION(KG/HA)

GRASS: 206 (110-301)
FORBS: 776 (350-1202)
SHRUBS: 110 (100-120)
TOTAL: 1092 (751-1432)

ECOLOGICALLY SUSTAINABLE STOCKING RATE
1.6 HA/AUM OR 3.8 AC/AUM

UFD6. Balsam poplar/ Willow/ Horsetail

(Populus balsamifera/ Salix spp/ Equisetum arvense)

n=1 This community type was described on the flood plain of the Wildhay River northwest of Hinton. This community is not common in the Upper Foothills subregion and likely represents the continued succession of a willow/ horsetail dominated community type (UFB12). Continued succession in the absence of disturbance will likely lead to the development of a Sw/ horsetail dominated community type (UFE6).

This community type is being used by livestock because of its close proximity to a right of way that had been seeded to Creeping red fescue and clover. When in close proximity to primary range areas this community type should be rated as secondary range.

PLANT COMPOSITION CANOPY COVER(%)

	MEAN	RANGE	CONST.
TREES			
ASPEN *(Populus tremuloides)*	5	-	100
BALSAM POPLAR *(Populus balsamifera)*	35	-	100
WHITE SPRUCE *(Picea glauca)*	3	-	100
SHRUBS			
PRICKLY ROSE *(Rosa acicularis)*	3	-	100
BEAKED WILLOW *(Salix bebbiana)*	50	-	100
FORBS			
HORSETAIL *(Equisetum arvense)*	12	-	100
SCOURING RUSH *(Equisetum scirpoides)*	9	-	100
TALL LUNGWORT *(Mertensia paniculata)*	3	-	100
LINDLEY'S ASTER *(Aster cilioatus)*	4	-	100
STRAWBERRY *(Fragaria virginiana)*	7	-	100
RED CLOVER (*Trifolium pratense*)	4	-	100
GRASSES			
HAIRY WILD RYE *(Elymus innovatus)*	1	-	100
MARSH REEDGRASS *(Calamagrostis canadensis)*	1	-	100
KENTUCKY BLUEGRASS (*Poa pratensis*)	1	-	100

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
SUBHYGRIC
NUTRIENT REGIME:
PERMESOTROPHIC
ELEVATION:
1500 M
SOIL DRAINAGE:
MODERATELY WELL

FORAGE PRODUCTION(KG/HA)

GRASS: 50
FORBS: 550
SHRUBS: 150
TOTAL: 750

ECOLOGICALLY SUSTAINABLE STOCKING RATE
2.4 HA/AUM

UFD7. Aw-Pl/Bunchberry

(Populus tremuloides-Pinus contorta/Cornus canadensis)

n=2 This community type represents an aspen community that is undergoing succession to a lodgepole pine dominated community type. This successional sequence is typical of south facing slopes throughout the Upper foothills subregion.

PLANT COMPOSITION CANOPY COVER(%)

	MEAN	RANGE	CONST.
TREES			
ASPEN *(Populus tremuloides)*	33	15-51	100
LODGEPOLE PINE *(Pinus contorta)*	20	10-30	100
SHRUBS			
PRICKLY ROSE *(Rosa acicularis)*	4	1-6	100
ALDER *(Alnus cripsa)*	4	0-7	50
FORBS			
BUNCHBERRY *(Cornus canadensis)*	18	7-29	100
WINTERGREEN *(Pyrola asarifolia)*	4	2-4	100
LINDLEY'S ASTER *(Aster cilioatus)*	3	1-5	100
STRAWBERRY *(Fragaria virginiana)*	3	2-3	100
DEWBERRY *(Rubus pubescens)*	1	1-2	100
GRASSES			
HAIRY WILD RYE *(Elymus innovatus)*	2	0-3	50
MOUNTAIN RICEGRASS *(Oryzopsis asperifolia)*	7	0-14	50

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
SUBMESIC-MESIC
NUTRIENT REGIME:
MESOTROPHIC
ELEVATION:
1500 M
SOIL DRAINAGE:
MODERATELY WELL

FORAGE PRODUCTION(KG/HA)

TOTAL: 900

ECOLOGICALLY SUSTAINABLE STOCKING RATE
2.0 HA/AUM

UPPER FOOTHILLS SUBREGION

CONIFER COMMUNITY TYPES

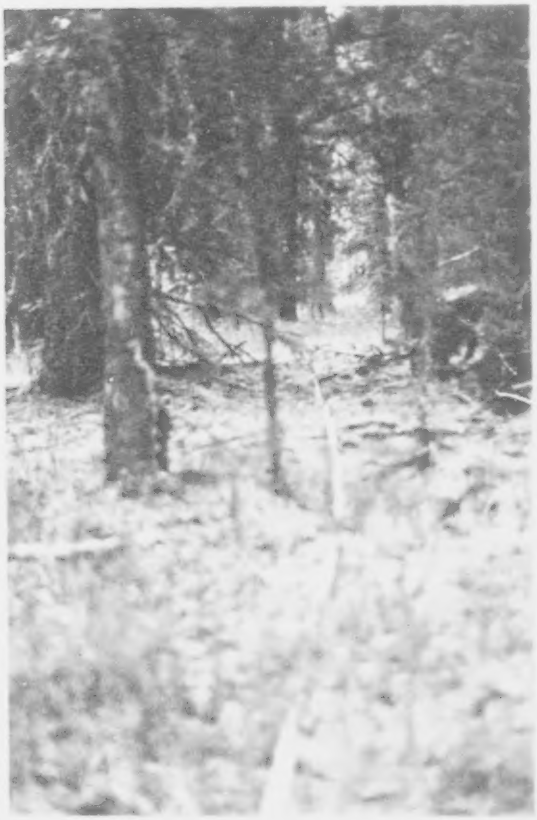


Figure 8. The Lodgepole pine-White spruce/Bunchberry community is the dominant conifer community type in the Upper Foothills subregion.

Conifer community types

Lodgepole pine dominates the overstory vegetation of the mesic reference sites in the Upper Foothills subregion. Typical forests are represented by the Pl/ bog cranberry (UFE1) and the Pl/ marsh reedgrass c.t. (UFE4) community types. Secondary succession is by white spruce and leads to the formation of the Pl-Sw/ bunchberry c.t. (UFE2) or Sw/Alder (UFE12). Continued succession on wetter sites, in the absence of disturbance, leads to a Sw/ horsetail/ moss dominated c.t. (UFE6) and to the Sw/ moss (UFE10) dominated community on more mesic sites.

Wetter, subhygric sites can be dominated by lodgepole pine, black spruce or white spruce. Many of these sites have a predominant willow understory (Pl/ willow/ moss (UFE3) or Sw/ willow(UFE7)). These types appear to represent continued succession from the native shrub and grassland community types. Succession in the absence of disturbance on these sites will be to white spruce. The Sw/ willow c.t. (UFE7) appears to be typical of a climax forest on these subhygric sites.

Black spruce dominates poorly drained depressional areas (Sb/ willow (UFE5)). These sites have a high water table throughout most of the year. Organic accumulations are a common result of the poor drainage conditions and low oxygen availability (Strong and Leggat, 1992).

Dry, south facing slopes are typically dominated by deciduous aspen forests with succession to a Sw/ bearberry (UFE8) and Pl/ bearberry/ hairy wildrye (UFE11) dominated community types (Beckingham et al., 1996). A Sw/ juniper (UFE9) c.t. was described on fine-textured, calcareous loess deposits, with high pH's near Brule lake. These deposits blow out of the Athabasca river valley from Jasper National Park.

The conifer forest types are generally unsuitable for livestock grazing and are typically rated as non-use. The 12 coniferous community types described in the Upper Foothills subregion are outlined in Table 5. A more complete description of coniferous community types can be found in Beckingham et al. (1996).

Key to Coniferous Community Types

1. Lodgepole pine dominated community 2
White or black spruce dominated community 5

2. The community is supported by well drained, coarse soil. It is often located on south facing slopes and exhibits a structured understory of grass, forb and shrub species 3
The community is located on less developed, wet soils which support a willow understory .... UFE3 Lodgepole pine/ Willow/ Moss

3. The community is succeeding to white spruce in undisturbed areas. Moss cover increases with canopy closure and grass, forb, and shrub species decline .... UFE2 Lodgepole pine-White spruce/ Bunchberry
The understory is dominated by shrubs, forbs or grasses 4

4. Shrubs dominate the understory on these well drained, south slopes 4a
Forbs and grasses dominate the understory .... UFE4 Lodgepole pine/ Marsh reedgrass

4a Moister sites with bog cranberry .... UFE1 Lodgepole pine/ Bog cranberry
Drier sites dominated by bearberry .... UFE11 Lodgepole pine/Bearberry/Hairy wildrye

5. Dry site conditions 6
Wet site conditions 7

6. Poor nutrient regime, bearberry dominates the understory, wind .... UFE8 White spruce/ Bearberry
Fine textured calcareous loess with a high pH .... UFE9 White spruce/ Juniper-Buffaloberry

7. Drainage is poor, willow dominates the understory 8
Mesic, moss dominates the understory 9

8. White spruce dominated overstory, wetter, low light .... UFE7 White spruce/ Willow
Black spruce dominated overstory, wet, often saturated soils .... UFE5 Black spruce/ Willow

9. Wet soils, canopy is closing, promoting, horsetail and moss. .... UFE6 White spruce/ Horsetail/ Moss
Closed canopy, successionally mature 10

10. Moss dominates understory .... UFE10 White spruce/ Moss
Alder dominates the understory .... UFE12 White spruce/Alder

Table 5. Conifer community types of the Upper Foothills subregion

Community name	Community type	Productivity(kg/Ha)				Moisture	Drainage	Carrying capacity (Ha/AUM)
		Grass	Forb	Shrub	Total			
b1 Ecological site phase bearberry/lichen Pl		**384**	**292**	**122**	**823**	**Subxeric**	**Well**	**Non-use**
UFE11	Pl/Bearberry/Hairy wildrye	384	292	122	823	Subxeric	Well	Non-use
c4 Ecological site phase hairy wildrye Sw		**297**	**176**	**181**	**517**	**Mesic**	**Mod.Well**	**Non-use**
UFE8.	White spruce/Bearberry				400	Mesic	Mod. Well	Non-Use
UFE9.	White spruce/Juniper-Buffaloberry	297	176	181	634	Mesic	Well	Non-Use
e1 Ecological site phase t. bilberry/arnica Pl		**62**	**316**	**92**	**478**	**Mesic**	**Well**	**Non-use**
UFE1.	Lodgepole pine/Bog cranberry	62	316	92	271	Mesic	Well	Non-use
UFE2.	Lodgepole pine-White spruce/ Bunchberry				361	Mesic	Well	Non-Use
UFE4.	Lodgepole pine/Marsh reedgrass				801	Mesic	Well	Non-Use
e3 Ecological site phase t. bilberry/arnica Sw		**151**	**222**	**568**	**973**	**Mesic**	**Well**	**Non-use**
UFE10	White spruce/Moss	78	96	160	332	Mesic	Well	Non-Use
UFE12	White spruce/Alder	224	348	976	1614	Mesic	Well	Non-use
f1 Ecological site phase bracted honeysuckle Pl		**478**	**192**	**252**	**845**	**Subhygric**	**Mod. Well**	**Non-use**
UFE3.	Lodgepole pine/Willow/Moss	478	192	252	845	Subhygric	Mod. Well	Non-Use
j1 Ecological site phase horsetail Sw		**83**	**223**	**98**	**359**	**Subhygric**	**Mod. Well**	**Non-use**
UFE6.	White spruce/Horsetail/Moss	83	223	98	418	Subhygric	Mod. Well	Non-Use
UFE7.	White spruce/Willow				300*	Subhygric	Mod. Well	Non-Use
k1 Ecological site phase treed bog		**89**	**166**	**130**	**385**	**Hygric**	**Imperfectly**	**Non-use**
UFE5.	Black spruce/Willow	89	166	130	385	Hygric	Imperfectly	Non-Use

* Estimate

UFE1. Lodgepole pine/ Bog cranberry

(Pinus contorta/ Vaccinium vitis-idaea)

n=8 This community type is common on dry, coarse textured, well drained sites throughout the Upper Foothills subregion and is part of the subxeric/ poor ecosite described by Beckingham et al. (1996). These sites are generally located on slopes with southerly aspects. This community type is very similar to the Pl/ hairy wildrye/ bunchberry community type described by Lane et al. (2000) in the Lower Foothills subregion, and the Pl-Sw/ low bush cranberry/ twinflower type described by Beckingham (1994) in the Upper Foothills subregion, but this community type appears to be drier with a poorer nutrient regime. Beckingham (1994), felt that white spruce would eventually dominate the canopy of this community type.

Generally, this community type is not useful for domestic livestock grazing because it does not produce good quality forage.

Plant Composition Canopy Cover(%)

	Mean	Range	Const.
Trees			
Lodgepole pine *(Pinus contorta)*	35	20-50	100
White spruce *(Picea glauca)*	7	0-20	50
Understory Trees			
White spruce *(Picea glauca)*	2	0-15	25
Shrubs			
Bog cranberry *(Vaccinium vitis-idaea)*	22	9-57	100
Labrador tea *(Ledum groenlandicum)*	4	0-18	63
Dewberry (*Rubus Pubescens*)	2	0-14	13
Bearberry *(Arctostaphylos uva-ursi)*	1	0-9	13
Bunchberry *(Cornus canadensis)*	5	0-14	88
Twinflower *(Linnaea borealis)*	6	0-21	88
Grasses			
Hairy wildrye *(Elymus innovatus)*	6	0-18	88
Moss	63	27-86	100

Environmental Variables

Moisture Regime:
Mesic
Nutrient Regime:
Submesotrophic
Elevation:
1091-1475 m (1354 m)
Soil Drainage:
Well
Aspect:
Variable
Slope:
0-15%

Forage Production (kg/ha)

Grass: 62
Forbs: 316
Shrubs: 92
Total 271 (89-470)

Ecologically sustainable stocking rate
Non-Use

UFE2. Lodgepole pine-White spruce/ Bunchberry

(Pinus contorta-Picea glauca/ Cornus canadensis)

n=5 This community type represents the modal type on mesic/ mesotrophic sites throughout the Upper Foothills subregion and may be transitional to the Lower Foothills subregion if aspen occurs in the stand. Strong (1992), found that lodgepole pine dominated the reference sites in this subregion with white spruce succession occurring on undisturbed areas. Beckingham (1994), described a similar community type (Pl-Sw/ low bush cranberry/ twinflower) and felt that white spruce and balsam fir will eventually dominate the canopy. The change in canopy dominance will lead to a decline in understory cover of shrubs and forbs. As succession occurs, moss cover will increase.

This community type would be rated as non-use range for domestic livestock. There is little forage that

PLANT COMPOSITION CANOPY COVER(%)

	MEAN	RANGE	CONST.
TREES			
LODGEPOLE PINE *(Pinus contorta)*	37	30-45	100
WHITE SPRUCE *(Picea glauca)*	21	0-35	80
SHRUBS			
DWARF BILBERRY *(Vaccinium caespitosum)*	3	0-7	80
BOG CRANBERRY *(Vaccinium vitis-idaea)*	3	0-5	80
WILLOW *(Salix spp.)*	2	0-5	60
BUNCHBERRY *(Cornus canadensis)*	21	2-39	100
TWIN-FLOWER *(Linnaea borealis)*	2	0-5	100
FORBS			
WILD STRAWBERRY *(Fragaria virginiana)*	1	0-3	60
GRASSES			
HAIRY WILD RYE *(Elymus innovatus)*	5	0-12	100
MARSH REEDGRASS *(Calamagrostis canadensis)*	1	0-1	80
MOSS	59	36-76	100

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
MESIC
NUTRIENT REGIME:
MESOTROPHIC
ELEVATION:
1091-1500 M (1368 M)
SOIL DRAINAGE:
WELL
ASPECT:
SOUTH
SLOPE:
0-15%

FORAGE PRODUCTION(KG/HA)

TOTAL: 361 (288-496)

ECOLOGICALLY SUSTAINABLE STOCKING RATE
NON-USE

UFE3. Lodgepole pine/ Willow/ Moss

(Pinus contorta/ Salix spp./ Moss spp.)

n=3 This community type is very similar to the other lodgepole pine dominated community types, but it is found on wetter soils that lack development. This community type is slightly drier than the Pl-Sb/ labrador tea-whortleberry/ bunchberry/ feather moss type described by Beckingham (1994) and the Sb/ willow dominated community type (UFE5) described in this guide. Herbaceous plants are scarce in the understory of this community type. As a result, there is little forage for domestic livestock and this community would be rated non-use.

PLANT COMPOSITION CANOPY COVER(%)

	MEAN	RANGE	CONST.
TREES			
LODGEPOLE PINE *(Pinus contorta)*	32	25-40	100
WHITE SPRUCE *(Picea glauca)*	13	5-30	100
SHRUBS			
WILLOW *(Salix spp.)*	23	13-34	100
BUNCHBERRY *(Cornus canadensis)*	4	1-6	100
TWIN-FLOWER *(Linnaea borealis)*	1	0-3	33
FORBS			
WILD STRAWBERRY *(Fragaria virginiana)*	3	1-4	100
PALMATE LEAVED COLTSFOOT *(Petasites palmatus)*	1	T	100
GRASSES			
HAIRY WILD RYE *(Elymus innovatus)*	4	T-7	100
MARSH REEDGRASS *(Calamagrostis canadensis)*	2	0-5	67
MOSS	59	31-75	100

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
SUBHYGRIC
NUTRIENT REGIME:
PERMESOTROPHIC
ELEVATION:
1390-1560 M (1451 M)
SOIL DRAINAGE:
MODERATELY WELL
ASPECT:
NORTHERLY
SLOPE:
0-10%

FORAGE PRODUCTION(KG/HA)

GRASS: 478 (283-672)
FORBS: 192 (170-214)
SHRUBS: 252 (204-300)
TOTAL: 845 (644-1046)

ECOLOGICALLY SUSTAINABLE STOCKING RATE
NON-USE

UFE4. Lodgepole pine/ Marsh reedgrass

(Pinus contorta/ Calamagrostis canadensis)

n=3 This community type is similar to the Pl /hairy wildrye/ fireweed-peavine community type described by Lane et al. (2000). The tree canopy is open which allows good understory growth.

The good understory forage production and easy access through this community type makes it useful for livestock grazing. If this community type occurs adjacent to a physical feature that attracts livestock to the area, it may be considered primary range.

PLANT COMPOSITION

	CANOPY COVER(%)		
	MEAN	RANGE	CONST.
TREES			
LODGEPOLE PINE *(Pinus contorta)*	13	0-30	67
WHITE SPRUCE *(Picea glauca)*	12	0-20	67
SHRUBS			
PRICKLY ROSE *(Rosa acicularis)*	1	T-2	100
BOG CRANBERRY *(Vaccinium vitis-idaea)*	2	0-7	33
BUNCHBERRY *(Cornus canadensis)*	5	2-9	100
TWIN-FLOWER *(Linnaea borealis)*	4	T-6	100
FORBS			
FIREWEED *(Epilobium angustifolium)*	3	2-3	100
LINDLEY'S ASTER *(Aster ciliolatus)*	3	T-6	100
GRASSES			
HAIRY WILD RYE *(Elymus innovatus)*	5	2-6	100
MARSH REEDGRASS *(Calamagrostis canadensis)*	12	4-18	100
MOSS	12	8-17	100

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
MESIC
NUTRIENT REGIME:
MESOTROPHIC
ELEVATION:
1350-1380 M (1367) M
SOIL DRAINAGE:
WELL
ASPECT:
VARIABLE
SLOPE:
0-45%

FORAGE PRODUCTION(KG/HA)

TOTAL: 801 (600-1200)

ECOLOGICALLY SUSTAINABLE STOCKING RATE
NON-USE

UFE5. Black spruce/ Willow

(Picea mariana/ Salix spp.)

n=2 This community type is characterized by a dominant cover of black spruce and a sparse understory cover. The sites are moist in the spring and dry out later in the growing season. Corns and Annas (1986), found that these forests have a fire origin and can persist for more than 150 years.

This community type would be considered non-use for domestic livestock.

PLANT COMPOSITION

PLANT COMPOSITION	CANOPY COVER(%)		
	MEAN	RANGE	CONST.
TREES			
BLACK SPRUCE *(Picea mariana)*	15	10-20	100
WHITE SPRUCE *(Picea glauca)*	6	2-10	100
SHRUBS			
WILLOW SPP. *(Salix spp.)*	49	32-65	100
LABRADOR TEA *(Ledum groenlandicum)*	7	0-14	50
BUNCHBERRY *(Cornus canadensis)*	7	0-13	50
FORBS			
PALMATE LEAVED COLTSFOOT *(Petasites palmatus)*	1	0-1	50
WILD STRAWBERRY *(Fragaria virginiana)*	1	T-1	100
HORSETAIL *(Equisetum spp)*	8	T-8	100
GRASSES			
WATER SEDGE *(Carex aquatilis)*	5	0-10	50
GRACEFUL SEDGE *(Carex praegracilis)*	4	0-8	50
MOSS	51	41-59	100

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
HYGRIC
NUTRIENT REGIME:
PERMESOTROPHIC
ELEVATION:
1415-1454 M (1435) M
SOIL DRAINAGE:
IMPERFECTLY
ASPECT:
NORTH
SLOPE:
0-10%

FORAGE PRODUCTION(KG/HA)

GRASS: 89 (62-116)
FORBS: 166 (15-316)
SHRUBS: 130 (30-230)
TOTAL: 385 (161-608)

ECOLOGICALLY SUSTAINABLE STOCKING RATE
NON-USE

UFE6. White spruce/ Horsetail/ Moss

(Picea glauca/ Equisetum arvense/ Moss spp.)

n=3 This community type is successionally more advanced than the Pl-Sw/ bunchberry community type (UFE2) previously described. The lack of fire disturbance has allowed white spruce to succeed into the lodgepole pine canopy and dominate the site. As these stands mature, their canopies close, shading the understory vegetation and allowing moss cover to increase. The sparseness and low palatablity of the vegetation limits the use of these stands by domestic livestock.

PLANT COMPOSITION	CANOPY COVER(%)		
	MEAN	RANGE	CONST.
TREES			
WHITE SPRUCE *(Picea glauca)*	43	15-65	100
BALSAM POPLAR *(Populus balsamifera)*	2	0-3	67
UNDERSTORY TREES			
BALSAM POPLAR *(Populus balsamifera)*	2	0-5	33
SHRUBS			
LOW BUSH CRANBERRY *(Viburnum edule)*	2	0-3	67
ROSE (*Rosa acicularis*)	5	0-14	67
TWINFLOWER *(Linnaea borealis)*	5	0-9	67
FORBS			
PALMATE LEAVED COLTSFOOT *(Petasites palmatus)*	11	0-22	67
SCOURING RUSH *(Equisetum scirpoides)*	9	0-16	67
HORSETAIL *(Equisetum arvense*)	9	9-12	100
TALL LUNGWORT *(Mertensia paniculata)*	2	0-4	67
GRASSES			
HAIRY WILDRYE *(Elymus innovatus)*	5	3-7	100
MOSS	37	0-91	67

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
SUBHYGRIC
NUTRIENT REGIME:
MESOTROPHIC
ELEVATION:
1350-1454 M (1415 M)
SOIL DRAINAGE:
MODERATELY WELL
ASPECT:
NORTHEAST
SLOPE:
3%

FORAGE PRODUCTION(KG/HA)

GRASS: 83 (68-96)
FORBS: 223 (212-234)
SHRUBS: 98 (0-196)
TOTAL: 418 (332-504)

ECOLOGICALLY SUSTAINABLE STOCKING RATE
NON-USE

UFE7. White spruce/ Willow

(Picea glauca/ Salix spp.)

n=1 This community type is similar to the Sw/ bunchberry/ moss community type, but is found on wetter sites, with poorer drainage. The wetter sites favour the growth of willow in the understory. The high cover of willow and spruce limits the amount of light reaching the understory. Consequently, there is little forage for domestic livestock.

PLANT COMPOSITION CANOPY COVER(%)

	MEAN	RANGE	CONST.
TREES			
WHITE SPRUCE *(Picea glauca)*	45	-	100
LODGEPOLE PINE *(Pinus contorta)*	10	-	100
SHRUBS			
WILLOW *(Salix spp.)*	60	-	100
BOG BIRCH *(Betula glandulosa)*	8	-	100
LOW BILBERRY *(Vaccinium caespitosum)*	6	-	100
TWIN-FLOWER *(Linnaea borealis)*	5	-	100
FORBS			
CREAM COLORED VETCHLING *(Lathyrus ochroleucus)*	2	-	100
LINDLEY'S ASTER *(Aster ciliolatus)*	9	-	100
WILD STRAWBERRY *(Fragaria virginiana)*	12	-	100
ALPINE ASTER *(Aster alpinus)*	3	-	100
YARROW *(Achillea millefolium)*	3	-	100
FIREWEED *(Epilobium angustifolium)*	3	-	100
GRASSES			
GRACEFUL SEDGE *(Carex praegracilis)*	7	-	100
HAIRY WILD RYE *(Elymus innovatus)*	8	-	100

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
SUBHYGRIC
NUTRIENT REGIME:
PERMESOTROPHIC
ELEVATION:
1646 M
SOIL DRAINAGE:
MODERATELY WELL
ASPECT:
WEST
SLOPE:
15%

FORAGE PRODUCTION(KG/HA)

TOTAL: 300

ECOLOGICALLY SUSTAINABLE STOCKING RATE
NON-USE

UFE8. White spruce/ Bearberry

(Picea glauca/ Arctostaphylos uva-ursi)

n=1 This community type is similar to the Sw/ buffaloberry/ bearberry c.t. described by Lane et al. (2000) in the Lower Foothills. This type is fairly dry with a poor nutrient regime; as indicated by the high abundance of bearberry. It may also be somewhat windswept and desiccated, as indicated by the low tree canopy cover.

If this community type is located near a physical feature that attracts livestock to the area it may be considered to be primary or secondary range. In other instances though, where it is not near an attractive feature, this community type would be considered non-use.

PLANT COMPOSITION CANOPY COVER(%)

	MEAN	RANGE	CONST.
TREES			
WHITE SPRUCE *(Picea glauca)*	20	-	100
ASPEN *(Populus tremuloides)*	8	-	100
SHRUBS			
SHRUBBY CINQUEFOIL *(Potentilla fruticosa)*	12	-	100
WILLOW SPP. *(Salix spp.)*	9	-	100
BOG BIRCH *(Betula glandulosa)*	7	-	100
BEARBERRY *(Arctostaphylos uva-ursi)*	23	-	100
FORBS			
SHOWY LOCOWEED *(Oxytropis splendens)*	10	-	100
WILD STRAWBERRY *(Fragaria virginiana)*	18	-	100
ALPINE MILKVETCH *(Astragalus alpinus)*	7	-	100
CLOVER *(Trifolium repens)*	6	-	100
DANDELION *(Taraxacum officinale)*	6	-	100
GRASSES			
PURPLE OATGRASS *(Schizachne purpurascens)*	18	-	100
SLENDER WHEATGRASS *(Agropyron trachycaulum)*	14	-	100
BLUNT SEDGE *(Carex obtustata)*	10	-	100

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
MESIC
NUTRIENT REGIME:
MESOTROPHIC
ELEVATION:
1311 M
SOIL DRAINAGE:
MODERATELY WELL

FORAGE PRODUCTION(KG/HA)

TOTAL: 400

ECOLOGICALLY SUSTAINABLE STOCKING RATE
NON-USE

UFE9. White spruce/ Juniper-Buffaloberry

(Picea glauca/ Juniperus horizontalis-Shepherdia canadensis)

n=2 This community type was described along the north shore of Brule lake. It is characteristic of the fine-textured, calcareous loess deposits which have blown down the Athabasca river valley from Jasper National Park. The soils of this community have a high pH (8) which supports a good cover of hairy wildrye. This community type is extremely slow growing. When harvested, the cutblocks resemble native grasslands (juniper/ hairy wildrye (UFF1) and rose/ hairy wildrye (UFF2)).

PLANT COMPOSITION

	CANOPY COVER(%)		
	MEAN	RANGE	CONST.
TREES			
WHITE SPRUCE *(Picea glauca)*	50	50	100
SHRUBS			
SHRUBBY CINQUEFOIL *(Potentilla fruticosa)*	3	1-4	100
CREEPING JUNIPER. *(Juniperus horizontalis)*	44	43-45	100
PRICKLY ROSE *(Rosa acicularis)*	7	6-8	100
BUFFALOBERRY *(Shepherdia canadensis)*	3	0-5	50
FORBS			
WHITE CAMAS *(Zigadenus elegans)*	4	T-7	100
SHOWY LOCOWEED *(Oxytropis splendens)*	2	T-3	100
NORTHERN HEDYSARUM *(Hedysarum boreale)*	2	0-4	50
NORTHERN BEDSTRAW *(Galium boreale)*	2	1-2	100
BASTARD TOAD FLAX *(Comandra umbellata)*	1	1-2	100
GRASSES			
HAIRY WILDRYE *(Elymus innovatus)*	14	13-14	100
BLUNT SEDGE *(Carex obtustata)*	4	3-5	100

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
MESIC
NUTRIENT REGIME:
MESOTROPHIC
ELEVATION:
1066 M
SOIL DRAINAGE:
WELL
ASPECT:
SOUTH
SLOPE:
0-5%

FORAGE PRODUCTION(KG/HA)

GRASS:	297 (294-300)
FORBS:	176 (146-206)
SHRUBS:	181 (36-326)
TOTAL:	654 (536-772)

ECOLOGICALLY SUSTAINABLE STOCKING RATE
NON-USE

UFE10. White spruce/ Moss

(Picea glauca/ Moss spp.)

n=1 This community type represents a successionally mature forested stand in the Upper Foothills subregion. As succession occurs from pine to spruce, the canopy cover becomes closed and the amount of understory vegetation decreases until most of the shrub, forb and grass layers have been eliminated. As a result, there is limited forage available for domestic livestock within these spruce dominated community types. This community is typically rated as non-use for domestic livestock.

PLANT COMPOSITION	CANOPY COVER(%) MEAN	RANGE	CONST.
TREES			
WHITE SPRUCE *(Picea glauca)*	45	-	100
LODGEPOLE PINE *(Pinus contorta)*	5	-	100
UNDERSTORY TREES			
SUBALPINE FIR *(Abies lasiocarpa)*	25	-	100
SHRUBS			
BUFFALOBERRY *(Shepherdia canadensis)*	5	-	100
BOG CRANBERRY. *(Vaccinium caespitosum)*	4	-	100
PRICKLY ROSE *(Rosa acicularis)*	2	-	100
TWINFLOWER *(Linnaea borealis)*	10	-	100
FORBS			
HEART LEAVED ARNICA *(Arnica cordifolia)*	8	-	100
SHOWY ASTER *(Aster conspicuus)*	5	-	100
BUNCHBERRY *(Cornus canadensis)*	3	-	100
STRAWBERRY *(Fragaria virginiana)*	2	-	100
GRASSES			
HAIRY WILDRYE *(Elymus innovatus)*	10	-	100
MOSS			
STAIR STEP MOSS *(Hylocomium splendens)*	90	-	100

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
MESIC
NUTRIENT REGIME:
MESOTROPHIC
ELEVATION:
1350 M
SOIL DRAINAGE:
WELL
ASPECT:
EAST
SLOPE:
10%

FORAGE PRODUCTION(KG/HA)

GRASS: 78
FORBS: 96
SHRUBS: 160
TOTAL: 332

ECOLOGICALLY SUSTAINABLE STOCKING RATE
NON-USE

UFE11. Lodgepole pine/ Bearberry/Hairy wildrye

(Pinus contorta/ Arctostaphylos uva-ursi/Elymus innovatus)

n=1 This community type is typical of dry, well drained south facing slopes throughout the Upper Foothills subregion and is part of the subxeric/ poor ecosite described by Beckingham et al. (1996). Beckingham (1994), felt that white spruce would eventually dominate the canopy of this community type.

Generally, this community type is not useful for domestic livestock grazing because it does not produce good quality forage.

PLANT COMPOSITION

PLANT COMPOSITION	CANOPY COVER(%)		
	MEAN	RANGE	CONST.
TREES			
LODGEPOLE PINE *(Pinus contorta)*	12	-	100
ASPEN *(Populus tremuloides)*	1	-	100
SHRUBS			
BOG CRANBERRY *(Vaccinium vitis-idaea)*	6	-	100
BUFFALOBERRY (*Shepherdia canadensis*)	6	-	100
FORBS			
LINDLEY'S ASTER (*Aster ciliolatus*)	4	-	100
BEARBERRY *(Arctostaphylos uva-ursi)*	18	-	100
STRAWBERRY *(Fragaria virginiana)*	6	-	100
TWINFLOWER *(Linnaea borealis)*	2	-	100
GRASSES			
HAIRY WILDRYE *(Elymus innovatus)*	7	-	100

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
SUBMESIC
NUTRIENT REGIME:
SUBMESOTROPHIC
ELEVATION:
1091-1475 M (1354 M)
SOIL DRAINAGE:
WELL
ASPECT:
VARIABLE
SLOPE:
0-15%

FORAGE PRODUCTION (KG/HA)

GRASS:	384
FORBS:	292
SHRUBS:	122
TOTAL	823

ECOLOGICALLY SUSTAINABLE STOCKING RATE
NON-USE

UFE12. White spruce/ Alder

(Picea glauca/ Alnus crispa)

n=1 This community type represents a successionally mature forested stand in the Upper Foothills subregion. As succession occurs from pine to spruce, the canopy cover becomes closed and the amount of understory vegetation decreases until most of the shrub, forb and grass layers have been eliminated. As a result, there is limited forage available for domestic livestock within these spruce dominated community types. This community is typically rated as non-use for domestic livestock.

PLANT COMPOSITION	CANOPY COVER(%)		
	MEAN	RANGE	CONST.
TREES			
WHITE SPRUCE *(Picea glauca)*	60	-	100
SHRUBS			
GREEN ALDER *(Alnus crispa)*	14	-	100
BOG CRANBERRY. *(Vaccinium caespitosum)*	2	-	100
PRICKLY ROSE *(Rosa acicularis)*	3	-	100
TWINFLOWER *(Linnaea borealis)*	4	-	100
FORBS			
FIREWEED *(Epilobium angustifolium)*	1	-	100
BUNCHBERRY *(Cornus canadensis)*	12	-	100
TALL LUNGWORT *(Mertensia paniculata)*	2	-	100
GRASSES			
HAIRY WILDRYE *(Elymus innovatus)*	6	-	100
MOUNTAIN RICEGRASS *(Oryzopsis asperifolia)*	3	-	100
MOSS			
STAIR STEP MOSS *(Hylocomium splendens)*	25	-	100

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
MESIC
NUTRIENT REGIME:
MESOTROPHIC
ELEVATION:
1350 M
SOIL DRAINAGE:
WELL
ASPECT:
SOUTHERLY
SLOPE:
10%

FORAGE PRODUCTION(KG/HA)

GRASS:	224
FORBS:	348
SHRUBS:	976
TOTAL:	1614

ECOLOGICALLY SUSTAINABLE STOCKING RATE
NON-USE

Cutblock and burn community types

In general, cutblocks provide only a limited source of forage for domestic livestock in the Upper Foothills subregion. The Brule stock association, Robb head tax permit and Upper James allotment are examples where the livestock rely principally on the forage within harvested cutblocks. On average, cutblocks produce twice as much forage as deciduous stands and nearly 3 times the forage as coniferous stands. In the Brule stock association, forage production on the cutblocks averaged 3-5 times greater than the unharvested white spruce dominated forest.

Two of the cutblock community types in this guide were described from the Brule stock association. These are the juniper/ hairy wildrye (UFF1) and rose/ hairy wildrye (UFF2) c.t.. Both of these types have very little growth of regenerating trees and resemble native grasslands (Figure 9).

Other cutblock community types were described on moister sites throughout the Solomon valley. These communities represent areas that were harvested 30-40 years ago. Currently, they are important sources of forage for domestic livestock throughout the area.

One burn community type was described from the Solomon valley. This burn occurred on an Se-Fa/ willow community approximately 10 years ago. The site was located in an area that had nutrient rich seepage that made it very productive for horses grazing the area. Another burned community was described west of Sundre. This burn occurred in Lodgepole pine about 3 years ago.

In the Upper James and Wilson creek allotments west of Sundre, harvesting of lodgepole pine dominated sites produces fireweed/ hairy wildrye dominated communities on south and west facing slopes. On the more northern aspects in this area, the cutblocks tended to be dominated by moss to form the Pl-Sw/ moss community type. Livestock preferred to graze the fireweed/ hairy wildrye dominated cutblocks.

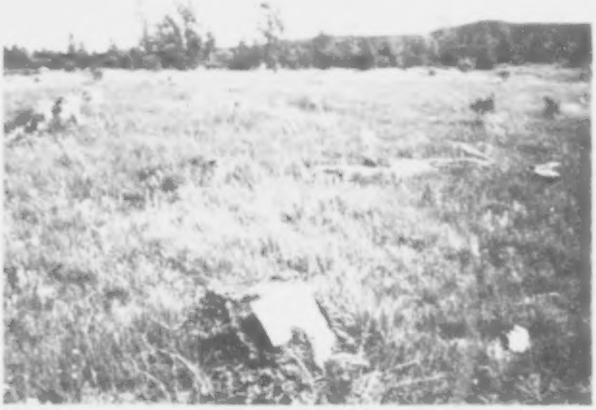


Figure 9. The juniper/ hairy wildrye community type (UFF1) results from the harvesting of a Sw/ juniper community.

UFF1. Juniper/ Hairy wildrye

(Juniperus horizontalis/ Elymus innovatus)

n=4 This community represents a harvested Sw/ juniper community along the north shore of Brule lake. It is characteristic of the fine-textured, calcareous loess deposits, which have blown down the Athabasca river valley from Jasper National Park. The soils of this community have a high pH (8) which supports a good cover of hairy wildrye. This community type is extremely slow growing. When harvested, the cutblocks resemble native grasslands.

This community is very similar to the rose/ hairy wildrye community, but appears to be in a later successional stage. This community type was described in older cutblocks (35 yrs) than the rose/ hairy wildrye community type (UFF2). As succession occurs on these cutblocks it appears that juniper and grass cover increase, causing a corresponding increase in forage production.

PLANT COMPOSITION	CANOPY COVER(%)		
	MEAN	RANGE	CONST.
TREES			
WHITE SPRUCE *(Picea glauca)*	12	5-18	100
BALSAM POPLAR (*Populus balsamifera*)	8	0-15	75
ASPEN (*Populus tremuloides*)	6	0-15	50
UNDERSTORY TREES			
WHITE SPRUCE *(Picea glauca)*	1	0-2	25
BALSAM POPLAR (*Populus balsamifera*)	1	0-1	25
ASPEN (*Populus tremuloides*)	1	0-2	50
SHRUBS			
SHRUBBY CINQUEFOIL *(Potentilla fruticosa)*	7	2-11	100
CREEPING JUNIPER *(Juniperus horizontalis)*	19	11-27	100
PRICKLY ROSE *(Rosa acicularis)*	6	0-10	75
WILLOW (*Salix spp.*)	14	3-15	100
BEARBERRY *(Arctostaphylos uva-ursi)*	9	0-17	75
FORBS			
SHOWY LOCOWEED *(Oxytropis splendens)*	3	1-4	100
NORTHERN HEDYSARUM *(Hedysarum boreale)*	6	0-7	75
NORTHERN BEDSTRAW *(Galium boreale)*	8	6-10	100
GRASSES			
HAIRY WILDRYE *(Elymus innovatus)*	12	3-24	100
BLUNT SEDGE *(Carex obtustata)*	6	0-15	75
SLENDER WHEATGRASS (*Agropyron trachycaulum*)	2	0-4	50

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
SUBMESIC
NUTRIENT REGIME:
SUBMESOTROPHIC
ELEVATION:
1036-1066 M (1046 M)
SOIL DRAINAGE:
WELL
ASPECT:
SOUTH
SLOPE:
0-5%

FORAGE PRODUCTION(KG/HA)

GRASS: 520 (268-866)
FORBS: 697 (124-1538)
SHRUBS: 267 (12-450)
TOTAL: 2089 (592-3732)

ECOLOGICALLY SUSTAINABLE STOCKING RATE
0.4 HA/AUM OR 1.0 AC/AUM

UFF2. Rose/ Hairy wildrye

(Rosa acicularis/ Elymus innovatus)

n=10 This community type represents a Sw/ juniper community that was harvested 20 years ago. It is very similar to the previously described juniper/ hairy wildrye community (UFF1), but lacks the cover of juniper. It appears that harvesting disturbance causes juniper to decline in cover. As succession occurs, juniper and grass density increase, causing forage productivity to increase. The site conditions are so harsh it appears that grass cover has to undergo succession onto the site.

PLANT COMPOSITION	CANOPY COVER(%)		
	MEAN	RANGE	CONST.
TREES			
WHITE SPRUCE *(Picea glauca)*	9	0-20	90
BALSAM POPLAR (*Populus balsamifera*)	6	0-15	80
ASPEN (*Populus tremuloides*)	2	0-10	30
UNDERSTORY TREES			
WHITE SPRUCE *(Picea glauca)*	2	0-15	10
BALSAM POPLAR (*Populus balsamifera*)	2	0-20	50
ASPEN (*Populus tremuloides*)	1	0-1	20
SHRUBS			
SHRUBBY CINQUEFOIL *(Potentilla fruticosa)*	1	0-4	80
CREEPING JUNIPER. *(Juniperus horizontalis)*	2	0-7	60
PRICKLY ROSE *(Rosa acicularis)*	4	0-13	90
WILLOW SPP. (*Salix spp.*)	6	0-10	80
BEARBERRY *(Arctostaphylos uva-ursi)*	1	0-7	50
FORBS			
WHITE CAMAS *(Zigadenus elegans)*	1	0-3	30
SHOWY LOCOWEED *(Oxytropis splendens)*	2	0-4	60
NORTHERN HEDYSARUM *(Hedysarum boreale)*	1	0-24	40
NORTHERN BEDSTRAW *(Galium boreale)*	4	T-11	100
DANDELION (*Taraxacum officinale*)	3	0-8	90
GRASSES			
HAIRY WILDRYE *(Elymus innovatus)*	24	4-40	100
BLUNT SEDGE *(Carex obtustata)*	2	0-7	60
SLENDER WHEATGRASS (*Agropyron trachycaulum*)	4	0-10	70

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
MESIC
NUTRIENT REGIME:
MESOTROPHIC
ELEVATION:
1036 M
SOIL DRAINAGE:
WELL
ASPECT:
SOUTHERLY
SLOPE:
2-10%

FORAGE PRODUCTION(KG/HA)

GRASS: 723 (212-1514)
FORBS: 388 (126-756)
SHRUBS: 132 (2-454)
TOTAL: 1243 (540-2360)

ECOLOGICALLY SUSTAINABLE STOCKING RATE
0.7 HA/AUM OR 1.6 AC/AUM

UFF2a. Fireweed/ Hairy wildrye

(Epilobium angustifolium/ Elymus innovatus)

n=28 This community type represents a Pl/ moss community that was harvested 5-7 years ago. This community type was described on south and west facing slopes throughout the area. On more northerly aspects, moss dominates the understory of these cutblocks. Cutblocks can be an important source of forage for domestic livestock. They produce on average twice as much as deciduous stands, and nearly three times more than conifer stands. It must be remembered that this increase in forage is only temporary. As the cutblock undergoes succession there is a corresponding drop in production.

PLANT COMPOSITION	CANOPY COVER(%)		
	MEAN	RANGE	CONST.
UNDERSTORY TREES			
LODGEPOLE PINE *(Pinus contorta)*	2	0-10	60
ASPEN (*Populus tremuloides*)	1	0-2	35
SHRUBS			
PRICKLY ROSE *(Rosa acicularis)*	1	0-5	82
WILLOW SPP. (*Salix spp.*)	1	0-6	40
FORBS			
BUNCHBERRY *(Cornus canadensis)*	1	0-1	67
FIREWEED *(Epilobium angustifolium)*	5	0-7	93
SHOWY ASTER *(Aster conspicuus)*	1	0-7	39
NORTHERN BEDSTRAW *(Galium boreale)*	1	0-1	39
GRASSES			
HAIRY WILDRYE *(Elymus innovatus)*	12	0-16	93
SEDGE *(Carex spp)*	2	0-9	91
PINEGRASS (*Calamagrostis rubescens*)	2	0-11	36

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
SUBMESIC-MESIC
NUTRIENT REGIME:
MESOTROPHIC-PERMESOTROPHIC
ELEVATION:
1390-1700 M (1433 M)
SOIL DRAINAGE:
WELL
ASPECT:
VARIABLE
SLOPE:
2-30%

FORAGE PRODUCTION(KG/HA)

GRASS:	1322 (190-4392)
FORBS:	316 (0-844)
SHRUB:	130(0-452)
TOTAL:	1761 (744-4396)

ECOLOGICALLY SUSTAINABLE STOCKING RATE
0.7 HA/AUM OR 1.7 AC/AUM

UFF3. White spruce/ Horsetail/ Kentucky bluegrass

(Picea glauca/ Equisetum arvense/ Poa pratensis)

n=1 This community type represents a Sw/ Horsetail community that was harvested 30-40 years ago along the banks of Moosehorn creek east of Rock Lake. These cutblocks are an important source of forage for domestic livestock and have been extensively utilized by cattle throughout the summer months. The high moisture and nutrient content of the sites make them extremely productive. Once invaded by agronomic species (Kentucky bluegrass and clover) they are extremely palatable to livestock.

PLANT COMPOSITION	CANOPY COVER(%)		
	MEAN	RANGE	CONST.
TREES			
WHITE SPRUCE *(Picea glauca)*	40	-	100
SHRUBS			
WILLOW *(Salix spp.)*	2	-	100
PRICKLY ROSE *(Rosa acicularis)*	3	-	100
FORBS			
DANDELION *(Taraxacum officinale)*	5	-	100
TALL LARKSPUR *(Delphinium glaucum)*	5	-	100
DEWBERRY *(Rubus pubescens)*	5	-	100
TALL LUNGWORT *(Mertensia paniculata)*	5	-	100
YARROW *(Achillea millefolium)*	3	-	100
HORSETAIL (*Equisetum arvense*)	2	-	100
GRASSES			
HAIRY WILDRYE *(Elymus innovatus)*	3	-	100
KENTUCKY BLUEGRASS *(Poa pratensis)*	12	-	100
SLENDER WHEATGRASS (*Agropyron trachycaulum*)	3	-	100

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
SUBHYGRIC
NUTRIENT REGIME:
PERMESOTROPHIC
ELEVATION:
1350 M
SOIL DRAINAGE:
MODERATELY WELL
ASPECT:
NORTH
SLOPE:
1%

FORAGE PRODUCTION(KG/HA)

GRASS: 498
FORBS: 2378
TOTAL: 2876

ECOLOGICALLY SUSTAINABLE STOCKING RATE
0.3 HA/AUM OR 0.7 AC/AUM

UFF4. White spruce/ Moss

(Picea glauca/ Moss spp.)

n=1 This community type represents a Sw/ moss community that was harvested 30-40 years ago along the banks of West Solomon Creek. The regeneration on this cutblock is to subalpine fir which is similar to the understory of the Sw/ moss (UFE10) community that was harvested in the same area. This community is an important source of forage for wintering horses. The open canopy cover allows for a greater abundance of forbs and grasses in the understory. As the community continues to undergo succession and the canopy becomes denser there will be a corresponding drop in available forage.

PLANT COMPOSITION

PLANT COMPOSITION	CANOPY COVER(%)		
	MEAN	RANGE	CONST.
TREES			
WHITE SPRUCE *(Picea glauca)*	10	-	100
SUBALPINE FIR *(Abies lasiocarpa)*	30	-	100
SHRUBS			
WILLOW *(Salix spp.)*	3	-	100
RIVER ALDER *(Alnus tenuifolia)*	3	-	100
BUNCHBERRY *(Cornus canadensis)*	1	-	100
FORBS			
FIREWEED *(Epilobium angustifolium)*	4	-	100
PEAVINE *(Lathyrus ochroleucus)*	1	-	100
MOSS			
FEATHER MOSS *(Pleurozium scherberi)*	6	-	100

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
MESIC
NUTRIENT REGIME:
MESOTROPHIC
ELEVATION:
1300 M
SOIL DRAINAGE:
MODERATELY WELL
ASPECT:
EAST
SLOPE:
10%

FORAGE PRODUCTION(KG/HA)

GRASS: 428
FORBS: 476
SHRUBS: 78
TOTAL: 982

ECOLOGICALLY SUSTAINABLE STOCKING RATE
0.9 HA/AUM OR 2.1 AC/AUM

UFF4a. Lodgepole pine-White spruce/ Moss

(Pinus contorta-Picea glauca/ Moss spp.)

n=9 This community type represents a Sw/ moss or Lodgepole pine community that was harvested 5-10 years ago. These moss dominated cutblocks tend to occupy north aspects where the climatic conditions are cooler and moister. Livestock do not prefer to graze these sites.

PLANT COMPOSITION CANOPY COVER(%)

	MEAN	RANGE	CONST.
TREES			
WHITE RUCE *(Picea glauca)*	4	0-15	66
LODGEPOLE PINE (*Pinus contorta*)	11	0-25	66
SHRUBS			
WILLOW *(Salix spp.)*	1	0-2	67
ROSE *(Rosa acicularis)*	1	0-2	100
FORBS			
BUNCHBERRY *(Cornus canadensis)*	3	0-10	66
FIREWEED *(Epilobium angustifolium)*	2	0-5	66
HORSETAIL *(Equisetum arvense)*	3	0-18	33
GRASS			
HAIRY WILDRYE *(Elymus innovatus)*	3	0-13	78
MARSH REEDGRASS (*Calamagrostis rubescens*)	4	0-6	56
MOSS			
FEATHER MOSS (*Pleurozium scherberi*)	1	0-3	50
STAIR STEP MOSS (*Hylocomium splendens*)	2	0-15	67

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
MESIC
NUTRIENT REGIME:
MESOTROPHIC
ELEVATION:
1335-1599 M (1470M)
SOIL DRAINAGE:
WELL
ASPECT:
VARIABLE
SLOPE:
0-28%

FORAGE PRODUCTION(KG/HA)

GRASS:	1963(1406-2420)
FORB:	213(192-228)
SHRUB:	160(0-160)
TOTAL:	2353(1872-2636)

ECOLOGICALLY SUSTAINABLE STOCKING RATE
NON-USE

UFF5. River alder-Willow/ Fireweed-Cow parsnip

(Alnus tenuifolia-Salix spp./ Epilobium angustifolium-Heracleum lanatum)

n=1 This community type represents a Engelmann x White spruce-Subalpine fir community that was burned 10 years ago. The site was located within a nutrient rich seepage area, which favoured the growth of cow parsnip, fireweed and horsetail. The lack of tree canopy cover and moisture and nutrient regime of the area made the site very productive for domestic livestock. This site was extensively utilized by horses throughout the winter and summer months.

PLANT COMPOSITION	CANOPY COVER(%) MEAN	RANGE	CONST.
TREES			
WHITE SPRUCE *(Picea glauca)*	3	-	100
ASPEN *(Populus tremuloides)*	5	-	100
SHRUBS			
WILLOW *(Salix spp.)*	5	-	100
RIVER ALDER *(Alnus tenuifolia)*	5	-	100
FORBS			
FIREWEED *(Epilobium angustifolium)*	21	-	100
COW PARSNIP *(Heracleum lanatum)*	13	-	100
STINGING NETTLE *(Urtica dioica)*	10	-	100
WHITE GERANIUM *(Geranium richardsonii)*	10	-	100
TALL LUNGWORT *(Mertensia paniculata)*	8	-	100
HORSETAIL *(Equisetum arvense)*	6	-	100
GRASSES			
SLENDER WHEATGRASS *(Agropyron trachycaulum)*	4	-	100
MARSH REEDGRASS *(Calamagrostis canadensis)*	3	-	100

ENVIRONMENTAL VARIABLES

MOISTURE REGIME: SUBHYGRIC
NUTRIENT REGIME: PERMESOTROPHIC
ELEVATION: 1200 M
SOIL DRAINAGE: MODERATELY WELL
ASPECT: EAST
SLOPE: 20%

FORAGE PRODUCTION(KG/HA)

GRASS: 122
FORBS: 3034
TOTAL: 3156

ECOLOGICALLY SUSTAINABLE STOCKING RATE
0.3 HA/AUM OR 0.6 AC/AUM

UFF6. Aspen/ Fireweed

(Populus tremuloides/ Epilobium angustifolium)

n=1 This community type represents a Pl-Sw/ bunchberry community that was harvested near the Robb area. The regeneration of this community back to aspen indicates that this particular cutblock is transitional to the Lower Foothills subregion. Indeed, the Robb area is on the border between the Upper and Lower Foothills subregions. This community type is highly productive for domestic livestock. Harvesting the trees allows the grasses and forbs to grow, increasing the forage productivity.

Plant Composition	Canopy Cover(%)		
	Mean	Range	Const.
Understory Trees			
White spruce *(Picea glauca)*	1	-	100
Aspen (*Populus tremuloides*)	6	-	100
Shrubs			
Prickly rose. *(Rosa acicularis)*	6	-	100
Green alder *(Alnus crispa)*	7	-	100
Dewberry (*Rubus pubescens*)	3	-	100
Forbs			
Fireweed *(Epilobium angustifolium)*	52	-	100
Horsetail *(Equisetum arvense)*	9	-	100
Heart leaved arnica *(Arnica cordifolia)*	8	-	100
Tall lungwort (*Mertensia paniculata*)	2	-	100
Grasses			
Sedge spp. (*Carex sp.*)	3	-	100
Marsh reedgrass (*Calamagrostis canadensis*)	13	-	100

Environmental Variables

Moisture Regime:
Mesic
Nutrient Regime :
Permesotrophic
Elevation:
1091 m
Soil Drainage :
Moderately well
Aspect:
North
Slope:
5%

FORAGE PRODUCTION(KG/HA)

Grass: 540
Forbs: 1520
Shrubs: 150
Total: 2210

Ecologically sustainable stocking rate
0.8 ha/AUM or 1.8 ac/AUM

UFF7. Aspen/ Blueberry-Bearberry/ Hairy wildrye

(Populus tremuloides/ Vaccinium myrtilloides-Arctostaphylos uva-ursi/ Elymus innovatus)

n=2 This community type represents a Pl/ bog cranberry community (UFE1) that was harvested near the Robb area. The ecological conditions of this site are drier with a poorer nutrient regime. Regeneration of the trees will be much slower than the Aw/ fireweed community type which was described previously. Harvesting of the pine overstory allows grasses and forbs to flourish. This provides a good forage base for domestic livestock. Caution must be used when grazing cutblocks that the stocking rate is not too high to limit the growth of regenerating trees.

PLANT COMPOSITION	CANOPY COVER(%)		
	MEAN	RANGE	CONST.
UNDERSTORY TREES			
WHITE SPRUCE *(Picea glauca)*	1	0-1	50
ASPEN (*Populus tremuloides*)	7	0-13	50
LODGEPOLE PINE (*Pinus contorta*)	2	T-3	100
SHRUBS			
BLUEBERRY *(Vaccinium myrtilloides)*	11	T-22	100
BOG CRANBERRY *(Vaccinium caespitosum)*	2	0-3	50
FORBS			
FIREWEED *(Epilobium angustifolium)*	1	0-2	50
LINDLEY'S ASTER *(Aster ciliolatus)*	2	0-4	50
STRAWBERRY *(Fragaria virginiana)*	2	T-3	100
YARROW (*Achillea millefolium*)	1	0-2	50
GRASSES			
INDIAN RICEGRASS (*Oryzopsis pungens*)	2	T-3	100
HAIRY WILDRYE (*Elymus innovatus*)	6	T-10	100

ENVIRONMENTAL VARIABLES

MOISTURE REGIME :
SUBMESIC
NUTRIENT REGIME:
MESOTROPHIC
ELEVATION:
1091 M
SOIL DRAINAGE :
WELL
ASPECT:
EAST
SLOPE:
3%

FORAGE PRODUCTION(KG/HA)

GRASS: 300
FORBS: 310
SHRUBS: 285
TOTAL: 895

ECOLOGICALLY SUSTAINABLE STOCKING RATE
2.0 HA/AUM OR 4.6 AC/AUM

UFF8. Kentucky bluegrass-Creeping red fescue/ Clover

(Poa pratensis-Festuca rubra/ Trifolium spp.)

n=6 This community type represents cutblocks that have been heavily grazed by livestock. Heavy livestock grazing favours the growth of the invaders Kentucky bluegrass and timothy. The grazing pressure which favours the growth of these grass species is usually detrimental to the growth of trees. Cattle damage to the conifer trees is usually trampling damage which scars the trees and breaks the stem.

PLANT COMPOSITION

PLANT COMPOSITION	CANOPY COVER(%) MEAN	RANGE	CONST.
SHRUBS			
ROSE *(Rosa acicularis)*	1	0-4	17
FORBS			
FIREWEED *(Epilobium angustifolium)*	1	0-3	67
CLOVER *(Trifolium spp.)*	11	0-48	50
STRAWBERRY *(Fragaria virginiana)*	1	0-2	50
YARROW (*Achillea millefolium*)	1	0-T	50
GRASSES			
TIMOTHY (*Phleum pratense*)	7	T-35	83
HAIRY WILDRYE (*Elymus innovatus*)	1	0-3	33
KENTUCKY BLUEGRASS (*Poa pratensis*)	13	0-67	67
CREEPING RED FESCUE (*Festuca rubra*)	15	0-41	83

ENVIRONMENTAL VARIABLES

MOISTURE REGIME: SUBMESIC-MESIC
NUTRIENT REGIME: SUBMESOTROPHIC-MESOTROPHIC
ELEVATION: 1435-1518 M (1464 M)
SOIL DRAINAGE: MODERATELY WELL
ASPECT: VARIABLE
SLOPE: 0-12%

FORAGE PRODUCTION(KG/HA)

GRASS: 932
TOTAL: 932

ECOLOGICALLY SUSTAINABLE STOCKING RATE
2.0 HA/AUM OR 4.6 AC/AUM

UFF9. Pl/Hairy wildrye

(Pinus contorta/Elymus innovatus)

n=2 This community type is similar to UFF2a (Fireweed/Hairy wildrye), but is successionally more advanced. As the cutblock undergoes succession and the trees become denser, there is a corresponding drop in forage production. It must be remembered that the initial increase in forage production is only temporary.

PLANT COMPOSITION CANOPY COVER(%)

	MEAN	RANGE	CONST.
TREES			
LODGEPOLE PINE (*Pinus contorta*)	17	10-24	100
SHRUBS			
ROSE *(Rosa acicularis)*	2	1-2	100
FORBS			
FIREWEED *(Epilobium angustifolium)*	6	5-6	100
STRAWBERRY *(Fragaria virginiana)*	1	1-2	100
BUNCHBERRY (*Cornus canadensis*)	1	1-1	100
GRASSES			
SEDGE (*Carex spp.*)	3	1-4	100
HAIRY WILDRYE (*Elymus innovatus*)	6	2-9	100

ENVIRONMENTAL VARIABLES

MOISTURE REGIME:
MESIC

NUTRIENT REGIME:
MESOTROPHIC

ELEVATION:
1420(1400-1435) M

SOIL DRAINAGE:
WELL

ASPECT:
VARIABLE

SLOPE:
6-9%

FORAGE PRODUCTION(KG/HA)

GRASS:	880
FORB:	282
SHRUB:	220
TOTAL:	2274

ECOLOGICALLY SUSTAINABLE STOCKING RATE
1.0 HA/AUM OR 2.5 AC/AUM

UFF10. Fireweed/Pinegrass

(Epilobium angustifolium/Calamagrostis rubescens)

n=2 This community type represents an Lodgepole pine dominated forest that recently burned in the last three years. This fire was extremely hot and burnt much of the organic matter on the soil surface. Presently there is little regeneration of trees and the dominant vegetation is patches of fireweed and pinegrass. This community type is easily accessible to livestock, but the patchiness of the vegetation makes the community highly susceptible to erosion if livestock grazing is too heavy and removes the existing vegetation. This community type should be rated as secondary range.

PLANT COMPOSITION

PLANT COMPOSITION	CANOPY COVER(%) MEAN	RANGE	CONST.
TREES			
ASPEN *(Populus tremuloides)*	1	0-1	50
SHRUBS			
ROSE *(Rosa acicularis)*	3	0-6	50
FORBS			
FIREWEED *(Epilobium angustifolium)*	13	10-15	100
STRAWBERRY *(Fragaria virginiana)*	1	1-2	100
BUNCHBERRY *(Cornus canadensis)*	4	1-5	100
GRASSES			
SEDGE *(Carex spp.)*	5	1-8	100
HAIRY WILDRYE *(Elymus innovatus)*	1	0-2	50
PINEGRASS *(Calamagrostis rubescens)*	15	11-17	100

ENVIRONMENTAL VARIABLES

MOISTURE REGIME: SUBMESIC-MESIC
NUTRIENT REGIME: SUBMESOTROPHIC-MESOTROPHIC
ELEVATION: 1496(1400-1593) M
SOIL DRAINAGE: WELL
ASPECT: SOUTHERLY
SLOPE: 0-27%

FORAGE PRODUCTION(KG/HA)

GRASS:	1272(878-1666)
FORB:	479(88-870)
SHRUB:	140(0-236)
TOTAL:	1924(1228-2621)

ECOLOGICALLY SUSTAINABLE STOCKING RATE
0.9 HA/AUM OR 1.3 AC/AUM

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